SLR-VB – 79

Seat No.	

Set **P**

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
ANALYSIS OF MECHANICAL ELEMENTS

Day and Date : Thursday, 4-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer cannot be changed* ***once*** *it is marked.*
2) Don't forget to mention Que. paper Set on the top of the page.
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***All*** *the sub-questions in Q. No.* ***1*** *are* ***compulsory*** *for* ***one*** *mark* ***each*** *and* ***every*** *question has* ***only one*** *correct answer.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) If E = Young's Modulus, K = Bulk Modulus and G = Shear Modulus, then
   a) E = 6KG/(3K + G) b) E = 9KG/(3K + G)
   c) E = 3KG/(6K + G) d) E = 3KG/(9K + G)

2) Usually, the failure criterion for ductile materials is
   a) yield tensile strength b) ultimate strength
   c) yield shear strength d) elastic limit

3) For a body subjected to only simple shear stress, the principal planes are inclined at
   a) 0° and 90° b) 0° and 180°
   c) 90° and 180° d) 45° and 135°

4) If diameter of a solid shaft is halved, the power transmitted P will change to
   a) P/8 b) 8P c) P/2 d) P/4

5) For a simply supported beam carrying a central point load, shape of S.F.D. is
   a) a rectangle b) a right angled triangle
   c) an isosceles triangle d) parabolic

6) For a cantilever of length l carrying a U.D.L. of w/m on its entire span, the maximum bending moment is given by
   a) $wl^2/12$ b) $wl^2/2$
   c) $wl^2/4$ d) $wl^2/8$

7) The radius of Mohr's circle always represents
   a) minimum principal stress b) difference between the principal stresses
   c) maximum principal stress d) maximum shear stress

P.T.O.

8) Variation of shear stress across the depth of a section of a beam is
   a) parabolic
   b) linear
   c) cubic
   d) exponential

9) For the same area, the strongest section of a beam under bending is
   a) rectangular section
   b) I-section
   c) circular section
   d) T-section

10) For a simply supported beam of length l carrying a U.D.L. w/m on its entire span, maximum deflection is given by
   a) $5wl^4/384$ EI
   b) $wl^4/24$ EI
   c) $wl^4/8$ EI
   d) $wl^4/48$ EI

11) For a cantilever carrying a point load at the free end
   a) slope is maximum at the fixed end
   b) deflection is maximum at the fixed end
   c) deflection is maximum at the centre
   d) slope is maximum at the free end

12) For a column with a circular section with diameter d, the least radius of gyration is
   a) d/2
   b) d/8
   c) d/4
   d) d/3

13) The equivalent length is half the actual length of a column with
   a) both ends hinged
   b) both ends fixed
   c) one end fixed and another end free
   d) one end fixed and another end hinged

14) If σ_g, σ_s and σ_i are the stresses induced when the same load acts gradually, suddenly and with impact respectively then
   a) $\sigma_g > \sigma_s > \sigma_i$
   b) $\sigma_s > \sigma_i > \sigma_g$
   c) $\sigma_i > \sigma_g > \sigma_s$
   d) $\sigma_i > \sigma_s > \sigma_g$

SLR-VB – 79

Seat No.	

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
ANALYSIS OF MECHANICAL ELEMENTS

Day and Date : Thursday, 4-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*

*2) **Use** of scientific calculator is **allowed**.*

*3) Figures to **right** indicate **full** marks.*

*4) Assume additional suitable data if **necessary** and state it **clearly**.*

SECTION – I

2. a) A steel wire 2 m long and 3 mm in diameter is extended by 0.75 mm when a weight is suspended from it. If the same weight is suspended from a brass wire 2.5 m long and 2 mm in diameter, it is extended by 4.64 mm. Determine Young's modulus of brass if that of steel is 200 GPa. **8**

   b) Draw S.F.D. and B.M.D. for a cantilever of length l subjected to a U.D.L. of w/m on its entire span. **6**

3. a) A solid steel shaft with diameter 40 mm and length 6 m is fixed at both the ends. A torque of 1.25 kNm is applied to it at a section 2.4 m from the left end. Determine the shear stresses in the two portions and the angle of twist where the torque is applied. Take Modulus of rigidity = 84 GPa. **10**

   b) Explain the terms 'Factory of Safety' and 'Working Stress'. **4**

4. a) An element carries the perpendicular stresses 50 MPa tensile and 30 MPa compressive. It also carries a shear stress of 30 MPa such that it tends to rotate the element anticlockwise when associated with plane of major stress. Calculate the principal stresses, maximum shear stress and the positions of their planes. **8**

   b) A cantilever 6 m long is fixed at its left end. It carries a U.D.L. of 0.5 kN/m for a length of 4 m from the fixed end and a point load of 2 kN at the free end. Draw S.F.D. and B.M.D. indicating salient points. **6**

SECTION – II

5. a) A beam has a T-section with flange 200 mm × 50 mm and the web 200 mm × 50 mm. A shear force of 200 kN acts on it. Determine the intensity of shear stress induced at important points and plot its distribution diagram, **8**

   b) Derive Rankine's formula to calculate the crippling load of a column. **6**

6. a) A cantilever beam of span 3 m is 15 cm wide and 25 cm deep. It carries a U.D.L. of 20 kN/m on its entire span and a point load of 25 kN at its free end. Calculate maximum slope and deflection. **8**

   b) Two beams with the same length and allowable stress are subjected to the same bending moment. The cross sections of the beams are a square and a rectangle with depth twice the width. Determine the ratio of the weight of the square beam to that of the rectangular beam. **6**

7. a) A metallic bar has a cross section of 7 cm^2 and a length of 1.5 m. ts elastic limit is 160 MPa. Calculate the following : **8**
      i) its proof resilience
      ii) maximum load which may be suddenly applied without exceeding the elastic limit.
      iii) the gradual load which will produce the same extension as produced by maximum suddenly applied load within the elastic limit.

   b) A solid round bar 60 mm in diameter and 2.5 m long is used as a column with one end fixed and another end hinged. Determine the safe load using Euler's formula assuming a factor of safety of 3 and E = 200 GPa. **6**

SLR-VB – 79

Seat No.	

Set **Q**

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Variation of shear stress across the depth of a section of a beam is
   a) parabolic b) linear
   c) cubic d) exponential

2) For the same area, the strongest section of a beam under bending is
   a) rectangular section b) I-section
   c) circular section d) T-section

3) For a simply supported beam of length l carrying a U.D.L. w/m on its entire span, maximum deflection is given by
   a) $5wl^4/384$ EI b) $wl^4/24$ EI
   c) $wl^4/8$ EI d) $wl^4/48$ EI

4) For a cantilever carrying a point load at the free end
   a) slope is maximum at the fixed end
   b) deflection is maximum at the fixed end
   c) deflection is maximum at the centre
   d) slope is maximum at the free end

5) For a column with a circular section with diameter d, the least radius of gyration is
   a) d/2 b) d/8
   c) d/4 d) d/3

6) The equivalent length is half the actual length of a column with
   a) both ends hinged b) both ends fixed
   c) one end fixed and another end free d) one end fixed and another end hinged

P.T.O.

7) If σ_g, σ_s and σ_i are the stresses induced when the same load acts gradually, suddenly and with impact respectively then

a) $\sigma_g > \sigma_s > \sigma_i$ b) $\sigma_s > \sigma_i > \sigma_g$

c) $\sigma_i > \sigma_g > \sigma_s$ d) $\sigma_i > \sigma_s > \sigma_g$

8) If E = Young's Modulus, K = Bulk Modulus and G = Shear Modulus, then
a) E = 6KG/(3K + G) b) E = 9KG/(3K + G)
c) E = 3KG/(6K + G) d) E = 3KG/(9K + G)

9) Usually, the failure criterion for ductile materials is
a) yield tensile strength b) ultimate strength
c) yield shear strength d) elastic limit

10) For a body subjected to only simple shear stress, the principal planes are inclined at
a) 0° and 90° b) 0° and 180°
c) 90° and 180° d) 45° and 135°

11) If diameter of a solid shaft is halved, the power transmitted P will change to
a) P/8 b) 8P c) P/2 d) P/4

12) For a simply supported beam carrying a central point load, shape of S.F.D. is
a) a rectangle b) a right angled triangle
c) an isosceles triangle d) parabolic

13) For a cantilever of length l carrying a U.D.L. of w/m on its entire span, the maximum bending moment is given by
a) $wl^2/12$ b) $wl^2/2$
c) $wl^2/4$ d) $wl^2/8$

14) The radius of Mohr's circle always represents
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SLR-VB – 79

Seat No.	

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
ANALYSIS OF MECHANICAL ELEMENTS

Day and Date : Thursday, 4-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*

*2) **Use** of scientific calculator is **allowed**.*

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SECTION – I

2. a) A steel wire 2 m long and 3 mm in diameter is extended by 0.75 mm when a weight is suspended from it. If the same weight is suspended from a brass wire 2.5 m long and 2 mm in diameter, it is extended by 4.64 mm. Determine Young's modulus of brass if that of steel is 200 GPa. **8**

   b) Draw S.F.D. and B.M.D. for a cantilever of length l subjected to a U.D.L. of w/m on its entire span. **6**

3. a) A solid steel shaft with diameter 40 mm and length 6 m is fixed at both the ends. A torque of 1.25 kNm is applied to it at a section 2.4 m from the left end. Determine the shear stresses in the two portions and the angle of twist where the torque is applied. Take Modulus of rigidity = 84 GPa. **10**

   b) Explain the terms 'Factory of Safety' and 'Working Stress'. **4**

4. a) An element carries the perpendicular stresses 50 MPa tensile and 30 MPa compressive. It also carries a shear stress of 30 MPa such that it tends to rotate the element anticlockwise when associated with plane of major stress. Calculate the principal stresses, maximum shear stress and the positions of their planes. **8**

   b) A cantilever 6 m long is fixed at its left end. It carries a U.D.L. of 0.5 kN/m for a length of 4 m from the fixed end and a point load of 2 kN at the free end. Draw S.F.D. and B.M.D. indicating salient points. **6**

SECTION – II

5. a) A beam has a T-section with flange 200 mm × 50 mm and the web 200 mm × 50 mm. A shear force of 200 kN acts on it. Determine the intensity of shear stress induced at important points and plot its distribution diagram, **8**

   b) Derive Rankine's formula to calculate the crippling load of a column. **6**

6. a) A cantilever beam of span 3 m is 15 cm wide and 25 cm deep. It carries a U.D.L. of 20 kN/m on its entire span and a point load of 25 kN at its free end. Calculate maximum slope and deflection. **8**

   b) Two beams with the same length and allowable stress are subjected to the same bending moment. The cross sections of the beams are a square and a rectangle with depth twice the width. Determine the ratio of the weight of the square beam to that of the rectangular beam. **6**

7. a) A metallic bar has a cross section of 7 cm^2 and a length of 1.5 m. ts elastic limit is 160 MPa. Calculate the following : **8**
      i) its proof resilience
      ii) maximum load which may be suddenly applied without exceeding the elastic limit.
      iii) the gradual load which will produce the same extension as produced by maximum suddenly applied load within the elastic limit.

   b) A solid round bar 60 mm in diameter and 2.5 m long is used as a column with one end fixed and another end hinged. Determine the safe load using Euler's formula assuming a factor of safety of 3 and E = 200 GPa. **6**

SLR-VB – 79

Seat No.	

Set **R**

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
ANALYSIS OF MECHANICAL ELEMENTS

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) For a simply supported beam carrying a central point load, shape of S.F.D. is
   a) a rectangle b) a right angled triangle
   c) an isosceles triangle d) parabolic

2) For a cantilever of length l carrying a U.D.L. of w/m on its entire span, the maximum bending moment is given by
   a) $wl^2/12$ b) $wl^2/2$
   c) $wl^2/4$ d) $wl^2/8$

3) The radius of Mohr's circle always represents
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   c) maximum principal stress d) maximum shear stress

4) Variation of shear stress across the depth of a section of a beam is
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5) For the same area, the strongest section of a beam under bending is
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6) For a simply supported beam of length l carrying a U.D.L. w/m on its entire span, maximum deflection is given by
   a) $5wl^4/384$ EI b) $wl^4/24$ EI
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P.T.O.

7) For a cantilever carrying a point load at the free end
   a) slope is maximum at the fixed end
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8) For a column with a circular section with diameter d, the least radius of gyration is
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10) If σ_g, σ_s and σ_i are the stresses induced when the same load acts gradually, suddenly and with impact respectively then
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   c) $\sigma_i > \sigma_g > \sigma_s$ d) $\sigma_i > \sigma_s > \sigma_g$

11) If E = Young's Modulus, K = Bulk Modulus and G = Shear Modulus, then
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13) For a body subjected to only simple shear stress, the principal planes are inclined at
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Seat No.	

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
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SECTION – I

2. a) A steel wire 2 m long and 3 mm in diameter is extended by 0.75 mm when a weight is suspended from it. If the same weight is suspended from a brass wire 2.5 m long and 2 mm in diameter, it is extended by 4.64 mm. Determine Young's modulus of brass if that of steel is 200 GPa. **8**

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   b) Explain the terms 'Factory of Safety' and 'Working Stress'. **4**

4. a) An element carries the perpendicular stresses 50 MPa tensile and 30 MPa compressive. It also carries a shear stress of 30 MPa such that it tends to rotate the element anticlockwise when associated with plane of major stress. Calculate the principal stresses, maximum shear stress and the positions of their planes. **8**

   b) A cantilever 6 m long is fixed at its left end. It carries a U.D.L. of 0.5 kN/m for a length of 4 m from the fixed end and a point load of 2 kN at the free end. Draw S.F.D. and B.M.D. indicating salient points. **6**

SECTION – II

5. a) A beam has a T-section with flange 200 mm × 50 mm and the web 200 mm × 50 mm. A shear force of 200 kN acts on it. Determine the intensity of shear stress induced at important points and plot its distribution diagram, **8**

   b) Derive Rankine's formula to calculate the crippling load of a column. **6**

6. a) A cantilever beam of span 3 m is 15 cm wide and 25 cm deep. It carries a U.D.L. of 20 kN/m on its entire span and a point load of 25 kN at its free end. Calculate maximum slope and deflection. **8**

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SLR-VB – 79

Seat No.	

Set S

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) For a simply supported beam of length l carrying a U.D.L. w/m on its entire span, maximum deflection is given by
   a) $5wl^4/384\ EI$ b) $wl^4/24\ EI$
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   a) d/2 b) d/8 c) d/4 d) d/3

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P.T.O.

6) If E = Young's Modulus, K = Bulk Modulus and G = Shear Modulus, then
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Seat No.	

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
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SECTION – I

2. a) A steel wire 2 m long and 3 mm in diameter is extended by 0.75 mm when a weight is suspended from it. If the same weight is suspended from a brass wire 2.5 m long and 2 mm in diameter, it is extended by 4.64 mm. Determine Young's modulus of brass if that of steel is 200 GPa. **8**

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SECTION – II

5. a) A beam has a T-section with flange 200 mm × 50 mm and the web 200 mm × 50 mm. A shear force of 200 kN acts on it. Determine the intensity of shear stress induced at important points and plot its distribution diagram, **8**

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6. a) A cantilever beam of span 3 m is 15 cm wide and 25 cm deep. It carries a U.D.L. of 20 kN/m on its entire span and a point load of 25 kN at its free end. Calculate maximum slope and deflection. **8**

   b) Two beams with the same length and allowable stress are subjected to the same bending moment. The cross sections of the beams are a square and a rectangle with depth twice the width. Determine the ratio of the weight of the square beam to that of the rectangular beam. **6**

7. a) A metallic bar has a cross section of 7 cm^2 and a length of 1.5 m. ts elastic limit is 160 MPa. Calculate the following : **8**
      i) its proof resilience
      ii) maximum load which may be suddenly applied without exceeding the elastic limit.
      iii) the gradual load which will produce the same extension as produced by maximum suddenly applied load within the elastic limit.

   b) A solid round bar 60 mm in diameter and 2.5 m long is used as a column with one end fixed and another end hinged. Determine the safe load using Euler's formula assuming a factor of safety of 3 and E = 200 GPa. **6**

SLR-VB – 80

Seat No.	

Set **P**

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
APPLIED THERMODYNAMICS

Day and Date : Friday, 5-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* *1) Figures to the **right** indicate **full** marks.*
*2) Make **suitable** assumptions **wherever** necessary and state them **clearly**.*
*3) Draw **neat** diagram **wherever** necessary.*
*4) **Use** of steam tables and Mollier diagram is **allowed**.*
*5) **Use** of scientific calculator is **allowed**.*
*6) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*7) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) Cooling of water takes place in cooling tower mainly due to
   a) Mixing of air and water
   b) Evaporative cooling
   c) Addition of heat into water
   d) None of the above

2) Region of cooling and region of heating are separated by
   a) Sublimation curve
   b) Inversion curve
   c) Vaporization curve
   d) Saturation curve

3) Carnot cycle is a reversible cycle because
   a) All the processes are reversible
   b) All the processes are irreversible
   c) All the processes are adiabatic
   d) All the processes are isothermal

4) The major heat loss in boiler is due to
   a) Moisture in fuel
   b) Dry fuel gases
   c) Steam formation
   d) Unburnt fuel

5) The ratio of heat actually used in producing the steam to the heat liberated in the furnace is called
   a) Equivalent evaporation b) Evaporative capacity
   c) Boiler efficiency d) Factor of evaporation

6) Effect of friction in nozzle _____ dryness fraction of steam.
   a) Increases b) Decreases c) No change d) None of the above

7) Supercritical cycle is operated
   a) Above critical point b) Below critical point
   c) Above triple point d) Below triple point

8) Isentropic expansion of steam through nozzle for the steam initially dry and saturated at inlet is approximated by equation
   a) $PV = C$ b) $PV^{1.4} = C$ c) $PV^{1.3} = C$ d) $PV^{1.135} = C$

9) In single stage single acting reciprocating compressor without clearance volume, the work done is minimum during
   a) Isothermal compression b) Isentropic compression
   c) Polytropic compression d) None of the above

10) Critical pressure ration for initially dry saturated steam is
   a) 0.528 b) 0.546 c) 0.577 d) 0.582

11) Adiabatic flame temperature is obtained at
   a) Stoichiometric air b) Excess air
   c) Deficit air d) None of these

12) Delaval turbine is
   a) Impulse reaction turbine b) Reaction turbine
   c) Multi rotor impulse turbine d) Single rotor impulse turbine

13) Due to intercooling the required workdone for compression
   a) Remains constant b) Increases
   c) Decreases d) None of the above

14) The term co-efficient of performance is related with
   a) Heat pump b) Heat engine c) Steam engine d) Gas turbine

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SLR-VB – 80

Seat No.	

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
APPLIED THERMODYNAMICS

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Sections.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make **suitable** assumptions **wherever** necessary and state them **clearly**.*
*4) Draw **neat** diagram **wherever** necessary.*
*5) **Use** of steam tables and Mollier diagram is **allowed**.*
*6) **Use** of scientific calculator is **allowed**.*

SECTION – I

2. a) In a Rankine cycle, dry saturated steam enters the turbine at a pressure of 15 bar and the exhaust pressure is 0.075 bar. Determine
   i) Rankine cycle efficiency ii) Specific steam consumption **5**
   b) State 2nd law of thermodynamics and prove that $COP_{HP} = COP_{refrigerator} + 1$. **4**
   c) Calculate the heat of reaction at 1000 k for the reaction
   $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$.
   The average molar heat capacities in the ideal gas state are
   $CH_4 = 200$ J/mol k, $O_2 = 33.62$ J/mol k, $CO_2 = 52.32$ J/mol k, $H_2O(g) = 38.49$ J/mol k. Assume enthalpy of formation for $CH_4 = -74.9$ kJ/mol, $CO_2 = -393$ kJ/mol, $H_2O = -242$ kJ/mol. **5**

3. a) A boiler produces wet steam having dryness fraction 0.90. The working pressure of boiler is 12 bar absolute. It generates steam at the rate of 640 kg/hr and consumes coal at the rate of 80 kg/hr, if the calorific value of coal is 31400 kJ/kg and water is fed at temp. of 20° C, calculate (i) equivalent evaporating/kg of coal (ii) factor of evaporation (iii) boiler efficiency. **5**
   b) Heat engine receives reversibly 420 kJ/cycle of heat from a source at 327° C and rejected heat reversibly to a sink at 27° C. There is no other heat transfer. Show which of the following cases the cycle is irreversible, reversible and impossible.
   i) 210 kJ/cycle is rejected ii) 105 kJ/cycle is rejected
   iii) 315 kJ/cycle is rejected **5**
   c) Explain ideal reheat cycle. **4**

4. a) A hot copper block of mass 30 kg and at a temp. of 500° C is dropped in 200 kg of oil at 20° C. If Cp_{oil} = 2.5 kJ/kgk and Cp_{copper} = 0.5 kJ/kgk, find the change in entropy of universe. **5**

   b) Derive the relation for discharging of a cylinder using control mass analysis. **5**

   c) Write short note on classification of Boilers. **4**

SECTION – II

5. a) Define condenser and explain with sketch the elements of steam condensing plants. **5**

   b) Steam enters a nozzle with a velocity of 250 m/s, pressure of 3 bar and dryness fraction 0.95. If the isentropic expansion in nozzle proceeds till the pressure at exit is 2 bar, calculate the exit velocity and area at exit from nozzle for flow of 0.75 kg/sec. **5**

   c) Compare impulse and reaction steam turbine. **4**

6. a) Derive an expression for maximum discharge through the nozzle. **5**

   b) A single stage reciprocating compressor has a bore of 200 mm and stroke of 300 mm. It runs at speed of 480 rpm. The clearance volume is 6% of the swept volume and law for compression, expansion is $PV^{1.3} = C$. Intake pressure is 98 kPa and temp. is 27° C and compressor delivery pressure is 500 kPa. Determine

   a) Volumetric efficiency
   b) Power required to run compressor
   c) Isothermal power
   d) Isothermal efficiency. **5**

   c) Write short note on factor affecting volumetric efficiency. **4**

7. a) What is necessity of multistage compression ? Derive the equation for intermediate pressure in case of two stage compression and also obtain the equation for minimum work required for two stage compression. **5**

   b) The following data relates to single stage impulse turbine :

   Steam velocity = 600 m/s

   Blade speed = 250 m/s

   Nozzle angle = 20°

   Blade outlet angle = 25° neglecting friction calculate work developed by the turbine for a steam feed rate of 20 kg/sec. also calculate axial thrust on the bearing. **5**

   c) Explain the classification of cooling towers in detail. **4**

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SLR-VB – 80

Seat No.	

Set Q

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
APPLIED THERMODYNAMICS

Day and Date : Friday, 5-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*
*2) Make **suitable** assumptions **wherever** necessary and state them **clearly**.*
*3) Draw **neat** diagram **wherever** necessary.*
*4) **Use** of steam tables and Mollier diagram is **allowed**.*
*5) **Use** of scientific calculator is **allowed**.*
*6) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*7) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) Isentropic expansion of steam through nozzle for the steam initially dry and saturated at inlet is approximated by equation
   a) $PV = C$ b) $PV^{1.4} = C$ c) $PV^{1.3} = C$ d) $PV^{1.135} = C$

2) In single stage single acting reciprocating compressor without clearance volume, the work done is minimum during
   a) Isothermal compression b) Isentropic compression
   c) Polytropic compression d) None of the above

3) Critical pressure ration for initially dry saturated steam is
   a) 0.528 b) 0.546
   c) 0.577 d) 0.582

4) Adiabatic flame temperature is obtained at
   a) Stoichiometric air b) Excess air
   c) Deficit air d) None of these

P.T.O.

5) Delaval turbine is
   a) Impulse reaction turbine b) Reaction turbine
   c) Multi rotor impulse turbine d) Single rotor impulse turbine

6) Due to intercooling the required workdone for compression
   a) Remains constant b) Increases
   c) Decreases d) None of the above

7) The term co-efficient of performance is related with
   a) Heat pump b) Heat engine c) Steam engine d) Gas turbine

8) Cooling of water takes place in cooling tower mainly due to
   a) Mixing of air and water b) Evaporative cooling
   c) Addition of heat into water d) None of the above

9) Region of cooling and region of heating are separated by
   a) Sublimation curve b) Inversion curve
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   c) All the processes are adiabatic d) All the processes are isothermal

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   c) Steam formation d) Unburnt fuel

12) The ratio of heat actually used in producing the steam to the heat liberated in the furnace is called
   a) Equivalent evaporation b) Evaporative capacity
   c) Boiler efficiency d) Factor of evaporation

13) Effect of friction in nozzle _____ dryness fraction of steam.
   a) Increases b) Decreases c) No change d) None of the above

14) Supercritical cycle is operated
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   c) Above triple point d) Below triple point

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SLR-VB – 80

Seat No.	

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
APPLIED THERMODYNAMICS

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Sections.*
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*4) Draw **neat** diagram **wherever** necessary.*
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SECTION – I

2. a) In a Rankine cycle, dry saturated steam enters the turbine at a pressure of 15 bar and the exhaust pressure is 0.075 bar. Determine
   i) Rankine cycle efficiency ii) Specific steam consumption **5**

   b) State 2nd law of thermodynamics and prove that $COP_{HP} = COP_{refrigerator} + 1$. **4**

   c) Calculate the heat of reaction at 1000 k for the reaction
   $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$.
   The average molar heat capacities in the ideal gas state are
   $CH_4 = 200$ J/mol k, $O_2 = 33.62$ J/mol k, $CO_2 = 52.32$ J/mol k, $H_2O(g) = 38.49$ J/mol k.
   Assume enthalpy of formation for $CH_4 = -74.9$ kJ/mol, $CO_2 = -393$ kJ/mol, $H_2O = -242$ kJ/mol. **5**

3. a) A boiler produces wet steam having dryness fraction 0.90. The working pressure of boiler is 12 bar absolute. It generates steam at the rate of 640 kg/hr and consumes coal at the rate of 80 kg/hr, if the calorific value of coal is 31400 kJ/kg and water is fed at temp. of 20° C, calculate (i) equivalent evaporating/kg of coal (ii) factor of evaporation (iii) boiler efficiency. **5**

   b) Heat engine receives reversibly 420 kJ/cycle of heat from a source at 327° C and rejected heat reversibly to a sink at 27° C. There is no other heat transfer. Show which of the following cases the cycle is irreversible, reversible and impossible.
   i) 210 kJ/cycle is rejected ii) 105 kJ/cycle is rejected
   iii) 315 kJ/cycle is rejected **5**

   c) Explain ideal reheat cycle. **4**

Set Q

4. a) A hot copper block of mass 30 kg and at a temp. of 500° C is dropped in 200 kg of oil at 20° C. If Cp_{oil} = 2.5 kJ/kgk and Cp_{copper} = 0.5 kJ/kgk, find the change in entropy of universe. **5**

   b) Derive the relation for discharging of a cylinder using control mass analysis. **5**

   c) Write short note on classification of Boilers. **4**

SECTION – II

5. a) Define condenser and explain with sketch the elements of steam condensing plants. **5**

   b) Steam enters a nozzle with a velocity of 250 m/s, pressure of 3 bar and dryness fraction 0.95. If the isentropic expansion in nozzle proceeds till the pressure at exit is 2 bar, calculate the exit velocity and area at exit from nozzle for flow of 0.75 kg/sec. **5**

   c) Compare impulse and reaction steam turbine. **4**

6. a) Derive an expression for maximum discharge through the nozzle. **5**

   b) A single stage reciprocating compressor has a bore of 200 mm and stroke of 300 mm. It runs at speed of 480 rpm. The clearance volume is 6% of the swept volume and law for compression, expansion is $PV^{1.3} = C$. Intake pressure is 98 kPa and temp. is 27° C and compressor delivery pressure is 500 kPa. Determine

   a) Volumetric efficiency
   b) Power required to run compressor
   c) Isothermal power
   d) Isothermal efficiency. **5**

   c) Write short note on factor affecting volumetric efficiency. **4**

7. a) What is necessity of multistage compression ? Derive the equation for intermediate pressure in case of two stage compression and also obtain the equation for minimum work required for two stage compression. **5**

   b) The following data relates to single stage impulse turbine :

   Steam velocity = 600 m/s

   Blade speed = 250 m/s

   Nozzle angle = 20°

   Blade outlet angle = 25° neglecting friction calculate work developed by the turbine for a steam feed rate of 20 kg/sec. also calculate axial thrust on the bearing. **5**

   c) Explain the classification of cooling towers in detail. **4**

Seat No.	

SLR-VB – 80

Set R

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
APPLIED THERMODYNAMICS

Day and Date : Friday, 5-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*
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*4) **Use** of steam tables and Mollier diagram is **allowed**.*
*5) **Use** of scientific calculator is **allowed**.*
*6) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*7) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) The ratio of heat actually used in producing the steam to the heat liberated in the furnace is called
   a) Equivalent evaporation b) Evaporative capacity
   c) Boiler efficiency d) Factor of evaporation

2) Effect of friction in nozzle _____ dryness fraction of steam.
   a) Increases b) Decreases c) No change d) None of the above

3) Supercritical cycle is operated
   a) Above critical point b) Below critical point
   c) Above triple point d) Below triple point

4) Isentropic expansion of steam through nozzle for the steam initially dry and saturated at inlet is approximated by equation
   a) $PV = C$ b) $PV^{1.4} = C$ c) $PV^{1.3} = C$ d) $PV^{1.135} = C$

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8) Delaval turbine is
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11) Cooling of water takes place in cooling tower mainly due to
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13) Carnot cycle is a reversible cycle because
   a) All the processes are reversible b) All the processes are irreversible
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14) The major heat loss in boiler is due to
   a) Moisture in fuel b) Dry fuel gases
   c) Steam formation d) Unburnt fuel

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SLR-VB – 80

Seat No.	

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
APPLIED THERMODYNAMICS

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Sections.*
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SECTION – I

2. a) In a Rankine cycle, dry saturated steam enters the turbine at a pressure of 15 bar and the exhaust pressure is 0.075 bar. Determine
   i) Rankine cycle efficiency ii) Specific steam consumption **5**
   b) State 2nd law of thermodynamics and prove that $COP_{HP} = COP_{refrigerator} + 1$. **4**
   c) Calculate the heat of reaction at 1000 k for the reaction
   $CH_4(g) + 2O_2(g) \rightarrow CO_2(g) + 2H_2O(g)$.
   The average molar heat capacities in the ideal gas state are
   $CH_4 = 200$ J/mol k, $O_2 = 33.62$ J/mol k, $CO_2 = 52.32$ J/mol k, $H_2O(g) = 38.49$ J/mol k. Assume enthalpy of formation for $CH_4 = -74.9$ kJ/mol, $CO_2 = -393$ kJ/mol, $H_2O = -242$ kJ/mol. **5**

3. a) A boiler produces wet steam having dryness fraction 0.90. The working pressure of boiler is 12 bar absolute. It generates steam at the rate of 640 kg/hr and consumes coal at the rate of 80 kg/hr, if the calorific value of coal is 31400 kJ/kg and water is fed at temp. of 20° C, calculate (i) equivalent evaporating/kg of coal (ii) factor of evaporation (iii) boiler efficiency. **5**
   b) Heat engine receives reversibly 420 kJ/cycle of heat from a source at 327° C and rejected heat reversibly to a sink at 27° C. There is no other heat transfer. Show which of the following cases the cycle is irreversible, reversible and impossible.
   i) 210 kJ/cycle is rejected ii) 105 kJ/cycle is rejected
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4. a) A hot copper block of mass 30 kg and at a temp. of 500° C is dropped in 200 kg of oil at 20° C. If Cp_{oil} = 2.5 kJ/kgk and Cp_{copper} = 0.5 kJ/kgk, find the change in entropy of universe. **5**

   b) Derive the relation for discharging of a cylinder using control mass analysis. **5**

   c) Write short note on classification of Boilers. **4**

SECTION – II

5. a) Define condenser and explain with sketch the elements of steam condensing plants. **5**

   b) Steam enters a nozzle with a velocity of 250 m/s, pressure of 3 bar and dryness fraction 0.95. If the isentropic expansion in nozzle proceeds till the pressure at exit is 2 bar, calculate the exit velocity and area at exit from nozzle for flow of 0.75 kg/sec. **5**

   c) Compare impulse and reaction steam turbine. **4**

6. a) Derive an expression for maximum discharge through the nozzle. **5**

   b) A single stage reciprocating compressor has a bore of 200 mm and stroke of 300 mm. It runs at speed of 480 rpm. The clearance volume is 6% of the swept volume and law for compression, expansion is $PV^{1.3} = C$. Intake pressure is 98 kPa and temp. is 27° C and compressor delivery pressure is 500 kPa. Determine

   a) Volumetric efficiency
   b) Power required to run compressor
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7. a) What is necessity of multistage compression ? Derive the equation for intermediate pressure in case of two stage compression and also obtain the equation for minimum work required for two stage compression. **5**

   b) The following data relates to single stage impulse turbine :

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   Blade outlet angle = 25° neglecting friction calculate work developed by the turbine for a steam feed rate of 20 kg/sec. also calculate axial thrust on the bearing. **5**

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SLR-VB – 80

Seat No.	

Set **S**

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
APPLIED THERMODYNAMICS

Day and Date : Friday, 5-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) Critical pressure ration for initially dry saturated steam is
   a) 0.528 b) 0.546 c) 0.577 d) 0.582

2) Adiabatic flame temperature is obtained at
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P.T.O.

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_____

SLR-VB – 80

Seat No.	

S.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
APPLIED THERMODYNAMICS

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Sections.*
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SECTION – I

2. a) In a Rankine cycle, dry saturated steam enters the turbine at a pressure of 15 bar and the exhaust pressure is 0.075 bar. Determine
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   b) State 2nd law of thermodynamics and prove that $COP_{HP} = COP_{refrigerator} + 1$. **4**
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   The average molar heat capacities in the ideal gas state are
   $CH_4 = 200$ J/mol k, $O_2 = 33.62$ J/mol k, $CO_2 = 52.32$ J/mol k, $H_2O(g) = 38.49$ J/mol k. Assume enthalpy of formation for $CH_4 = -74.9$ kJ/mol, $CO_2 = -393$ kJ/mol, $H_2O = -242$ kJ/mol. **5**

3. a) A boiler produces wet steam having dryness fraction 0.90. The working pressure of boiler is 12 bar absolute. It generates steam at the rate of 640 kg/hr and consumes coal at the rate of 80 kg/hr, if the calorific value of coal is 31400 kJ/kg and water is fed at temp. of 20° C, calculate (i) equivalent evaporating/kg of coal (ii) factor of evaporation (iii) boiler efficiency. **5**
   b) Heat engine receives reversibly 420 kJ/cycle of heat from a source at 327° C and rejected heat reversibly to a sink at 27° C. There is no other heat transfer. Show which of the following cases the cycle is irreversible, reversible and impossible.
   i) 210 kJ/cycle is rejected ii) 105 kJ/cycle is rejected
   iii) 315 kJ/cycle is rejected **5**
   c) Explain ideal reheat cycle. **4**

4. a) A hot copper block of mass 30 kg and at a temp. of 500° C is dropped in 200 kg of oil at 20° C. If Cp_{oil} = 2.5 kJ/kgk and Cp_{copper} = 0.5 kJ/kgk, find the change in entropy of universe. **5**

   b) Derive the relation for discharging of a cylinder using control mass analysis. **5**

   c) Write short note on classification of Boilers. **4**

SECTION – II

5. a) Define condenser and explain with sketch the elements of steam condensing plants. **5**

   b) Steam enters a nozzle with a velocity of 250 m/s, pressure of 3 bar and dryness fraction 0.95. If the isentropic expansion in nozzle proceeds till the pressure at exit is 2 bar, calculate the exit velocity and area at exit from nozzle for flow of 0.75 kg/sec. **5**

   c) Compare impulse and reaction steam turbine. **4**

6. a) Derive an expression for maximum discharge through the nozzle. **5**

   b) A single stage reciprocating compressor has a bore of 200 mm and stroke of 300 mm. It runs at speed of 480 rpm. The clearance volume is 6% of the swept volume and law for compression, expansion is $PV^{1.3} = C$. Intake pressure is 98 kPa and temp. is 27° C and compressor delivery pressure is 500 kPa. Determine

      a) Volumetric efficiency
      b) Power required to run compressor
      c) Isothermal power
      d) Isothermal efficiency. **5**

   c) Write short note on factor affecting volumetric efficiency. **4**

7. a) What is necessity of multistage compression ? Derive the equation for intermediate pressure in case of two stage compression and also obtain the equation for minimum work required for two stage compression. **5**

   b) The following data relates to single stage impulse turbine :

      Steam velocity = 600 m/s

      Blade speed = 250 m/s

      Nozzle angle = 20°

      Blade outlet angle = 25° neglecting friction calculate work developed by the turbine for a steam feed rate of 20 kg/sec. also calculate axial thrust on the bearing. **5**

   c) Explain the classification of cooling towers in detail. **4**

SLR-VB – 81

Seat No.	

Set **P**

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 6-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
*2) Use of calculator and statistical tables are **allowed**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) $\frac{1}{D^2+9}$ cos3x is equal to

a) $\frac{x}{3}\cos 3x$ b) $\frac{x}{6}\sin 3x$ c) $\frac{x}{3}\sin 3x$ d) $\frac{-x}{3}\sin 3x$

2) $\frac{1}{D-a}x$ is equal to

a) $\int xe^{ax}dx$ b) $\int xe^{-ax}dx$ c) $e^{-ax}\int xe^{ax}dx$ d) $e^{ax}\int e^{-ax}xdx$

3) The solution of $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}=0$ is y =

a) $C_1 + C_2$ b) $C_1 + C_2e^{-z}$
c) $C_1 + C_2e^{-x}$ d) $C_1 + C_2\log x$

4) If $\vec{r}$ is the position vector, then $\text{div}\,\vec{F}$ =

a) 3 b) 2 c) 1 d) 0

5) For a vector function $\vec{F}$ there exists a scalar potential when

a) $\text{div}\,\vec{F}=0$ b) $\text{grad}(\text{div}\,\vec{F})=0$

c) $\vec{F}.\text{curl}\vec{F}=0$ d) $\text{curl}\vec{F}=0$

P.T.O.

6) The solution of $q = 3p^2$ is

a) $z = ax + 3a^2y + c$ b) $z = 3ax + a^2y + c$

c) $z = 3ax^2 + by$ d) $z = ax + \frac{a^2}{3}y + c$

7) The solution of $px^2 + qy^2 = z^2$ is

a) $\phi(x + y + z, x - y - z) = 0$ b) $\phi\left(\frac{1}{x} - \frac{1}{y}, \frac{1}{y} - \frac{1}{z}\right) = 0$

c) $\phi(x^2 + y^2 + z^2, xyz) = 0$ d) None of these

8) The value of integral $\int_0^{1+i} z^2 dz$ along the line $y = x$ is equal to

a) $\frac{2}{3}(1-i)$ b) $\frac{2}{3}(i-1)$ c) $\frac{2}{3}(1+i)$ d) $\frac{2}{3}$

9) The variance of binomial distribution is

a) np b) nq c) npq d) pq

10) A random variable X has a Poisson distribution with mean 6, then P(X = 1) =

a) 0.015 b) 0.055 c) 0.15 d) 0.25

11) Accepting null hypothesis when it is false, such error is called

a) Error of type I b) Error of type III

c) Error of type II d) None of these

12) When sample size is less than 30 and population standard deviation σ is known, then which of the following test is selected ?

a) z-test b) χ^2-test c) t-test d) none of these

13) For testing hypothesis using left tailed test null hypothesis is rejected when

a) $z = z_\alpha$ b) $z > z_\alpha$ c) $z < z_\alpha$ d) none of these

14) χ^2-distribution is defined by

a) $\Sigma\frac{(O-E)}{E^2}$ b) $\Sigma\frac{(O-E)}{E}$ c) $\Sigma\left(\frac{O-E}{E}\right)^2$ d) $\Sigma\frac{(O-E)^2}{E}$

SLR-VB – 81

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
*2) Use of calculator and statistical tables are **allowed**.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Solve $(D^3 + 1)y = 65\cos(2x + 1)$. **3**

b) Solve $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + \frac{dy}{dx} = x^3$. **3**

c) Solve $(D^2 - 2D + 5)y = e^{2x}\sin x$. **3**

3. a) The differential equation of a body projected upward in a resisting medium is given by $\frac{d^2s}{dt^2} + k\frac{ds}{dt} = -g$.

If t = 0, s = 0 and $\frac{ds}{dt} = v_0$, show that $s = \left(\frac{g}{k^2} + \frac{v_0}{k}\right)(1 - e^{-kt}) - \frac{gt}{k}$. **5**

b) Solve $(3x + 2)^2\frac{d^2y}{dx^2} + 3(3x + 2)\frac{dy}{dx} - 36y = 8x^2 + 4x + 1$. **4**

OR

b) Solve $x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = \frac{1}{x^2}$. **4**

4. a) Solve $xq = yp + xe^{x^2+y^2}$. **3**

b) Solve $z^2(p^2 + q^2) = x + y$. **3**

c) Use variable separable method to solve $4\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 3z$, given $z(0, y) = 2e^{5y}$. **4**

5. a) A particle moves along the curve $\vec{r} = e^{-t}\cos t\,\hat{i} + e^{-t}\sin t\,\hat{j} + e^{-t}\hat{k}$. Find the velocity and acceleration vectors and magnitude of velocity and acceleration at time t. **3**

b) Prove that $r^n\vec{r}$ is irrotational vector, where $\vec{r}$ and r have their usual meaning. **3**

c) Find $\text{div}\,\vec{F}$ and $\text{curl}\,\vec{F}$ if $\vec{F} = \nabla\phi$, where $\phi = x^3 + y^3 + z^3 - 3xyz$. **3**

Set P

SECTION – II

6. a) A die was thrown 132 times and the following frequencies were observed :

Number obtained :	1	2	3	4	5	6	**Total**
Frequency :	15	20	25	15	29	28	**132**

Test the hypothesis that the die is unbiased.

(Given : Table value of χ^2 at 5% L.O.S. with 5 D.F. = 11.07). **3**

b) Two batches of 12 animals each are given test of inoculation. One batch was inoculated and other was not. The number of dead and surviving animals are given in the following table for both cases. Can the inoculation be regarded as effective against the disease at 5% L.O.S. ?

	Dead	**Surviving**	**Total**
Inoculated	2	10	12
Not inoculated	8	4	12
Total	10	14	24

(Given : The table value of χ^2 at 1 D.F. = 3.81). **3**

c) Evaluate $\int_C \frac{z+6}{z^2-4} dz$ where C is the circle $|z - 2| = 1$. **3**

7. a) Determine the constants a, b, c, d if $f(z) = x^2 + 2axy + by^2 + i(cx^2 + 2dxy + y^2)$ is analytic. **3**

b) Show that u = cosxcoshy is a harmonic function, find its harmonic conjugate. **3**

c) Mine items of a sample had the following values :

45, 47, 50, 52, 48, 47, 49, 53, 51

Does the mean of 9 items differ significantly from the assumed population mean 47.5 ?

(Given : Critical value of t for two tailed test at 5% L.O.S. with 8 D.F. = 2.306). **4**

8. a) A candidate at an election claims that, in a locality 90% voters support him. Verify his claim if in a random sample of 400 voters from a locality, 320 supported him.

(Given : Critical value of z at 5% L.O.S. for two tailed test = 1.96). **3**

b) A random sample of 400 members is found to have a mean of 4.45 cms. Can it be reasonably regarded as a sample from a large population whose mean is 5 cms and whose variance is 4 cms ?

(Given : Critical value of z at 5% L.O.S. for two tailed test is 1.96). **3**

c) Six dice are thrown 729 times. How many times do you expect atleast three dice to show a 5 or 6 ? **3**

9. a) Weights of 4000 students are found to be normally distributed with mean 50 kg and standard deviation 5 kgs. Find the number of students with weights (i) less than 45 kgs (ii) between 45 and 60 kgs. (Given : For a S.M.V.Z. area under the curve between z = 0 and z = 1 is 0.3413 and that between z = 0 and z = 2 is 0.4772). **3**

OR

a) Evaluate $\int_{1-i}^{2+i} (2x + iy + 1) dz$ along the straight line joining 1 – i to 2 + i. **3**

b) In a sampling the mean number of defective bolts manufactured by a machine in a sample of 20 is 2. Determine the expected number of samples out of such 500 samples to contain atleast 2 defective bolts. **3**

c) The average of marks scored by 32 boys is 72 with standard deviation 8 while that of 36 girls is 70 with standard deviation 6. Test at 1% level of significance whether the boys perform better than the girls.

(Given : Critical value of z at 1% L.O.S. for two tailed test = 2.58). **3**

SLR-VB – 81

Seat No.	

Set **Q**

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 6-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) The value of integral $\int_0^{1+i} z^2 dz$ along the line y = x is equal to

a) $\frac{2}{3}(1-i)$ b) $\frac{2}{3}(i-1)$ c) $\frac{2}{3}(1+i)$ d) $\frac{2}{3}$

2) The variance of binomial distribution is

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a) Error of type I b) Error of type III
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5) When sample size is less than 30 and population standard deviation σ is known, then which of the following test is selected ?

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P.T.O.

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Set Q

SLR-VB – 81

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

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SECTION – I

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Set Q

SECTION – II

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(Given : Critical value of z at 1% L.O.S. for two tailed test = 2.58). **3**

SLR-VB – 81

Seat No.	

Set **R**

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 6-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) For a vector function $\vec{F}$ there exists a scalar potential when

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a) $z = ax + 3a^2y + c$ b) $z = 3ax + a^2y + c$

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3) The solution of $px^2 + qy^2 = z^2$ is

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5) The variance of binomial distribution is

a) np b) nq c) npq d) pq

P.T.O.

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14) If $\vec{r}$ is the position vector, then $\text{div}\,\vec{F}$ =

a) 3 b) 2 c) 1 d) 0

SLR-VB – 81

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 6-5-2017 Marks : 56
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SECTION – I

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3. a) The differential equation of a body projected upward in a resisting medium is given by $\frac{d^2s}{dt^2} + k\frac{ds}{dt} = -g$.

If t = 0, s = 0 and $\frac{ds}{dt} = v_0$, show that $s = \left(\frac{g}{k^2} + \frac{v_0}{k}\right)(1 - e^{-kt}) - \frac{gt}{k}$. **5**

b) Solve $(3x + 2)^2\frac{d^2y}{dx^2} + 3(3x + 2)\frac{dy}{dx} - 36y = 8x^2 + 4x + 1$. **4**

OR

b) Solve $x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = \frac{1}{x^2}$. **4**

4. a) Solve $xq = yp + xe^{x^2+y^2}$. **3**

b) Solve $z^2(p^2 + q^2) = x + y$. **3**

c) Use variable separable method to solve $4\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 3z$, given $z(0, y) = 2e^{5y}$. **4**

5. a) A particle moves along the curve $\vec{r} = e^{-t}\cos t\,\hat{i} + e^{-t}\sin t\,\hat{j} + e^{-t}\hat{k}$. Find the velocity and acceleration vectors and magnitude of velocity and acceleration at time t. **3**

b) Prove that $r^n\vec{r}$ is irrotational vector, where $\vec{r}$ and r have their usual meaning. **3**

c) Find $\text{div}\,\vec{F}$ and $\text{curl}\,\vec{F}$ if $\vec{F} = \nabla\phi$, where $\phi = x^3 + y^3 + z^3 - 3xyz$. **3**

Set R

SECTION – II

6. a) A die was thrown 132 times and the following frequencies were observed :

Number obtained :	1	2	3	4	5	6	**Total**
Frequency :	15	20	25	15	29	28	**132**

Test the hypothesis that the die is unbiased.

(Given : Table value of χ^2 at 5% L.O.S. with 5 D.F. = 11.07). **3**

b) Two batches of 12 animals each are given test of inoculation. One batch was inoculated and other was not. The number of dead and surviving animals are given in the following table for both cases. Can the inoculation be regarded as effective against the disease at 5% L.O.S. ?

	Dead	**Surviving**	**Total**
Inoculated	2	10	12
Not inoculated	8	4	12
Total	10	14	24

(Given : The table value of χ^2 at 1 D.F. = 3.81). **3**

c) Evaluate $\int_C \frac{z+6}{z^2-4} dz$ where C is the circle $|z - 2| = 1$. **3**

7. a) Determine the constants a, b, c, d if $f(z) = x^2 + 2axy + by^2 + i(cx^2 + 2dxy + y^2)$ is analytic. **3**

b) Show that u = cosxcoshy is a harmonic function, find its harmonic conjugate. **3**

c) Mine items of a sample had the following values :

45, 47, 50, 52, 48, 47, 49, 53, 51

Does the mean of 9 items differ significantly from the assumed population mean 47.5 ?

(Given : Critical value of t for two tailed test at 5% L.O.S. with 8 D.F. = 2.306). **4**

8. a) A candidate at an election claims that, in a locality 90% voters support him. Verify his claim if in a random sample of 400 voters from a locality, 320 supported him.

(Given : Critical value of z at 5% L.O.S. for two tailed test = 1.96). **3**

b) A random sample of 400 members is found to have a mean of 4.45 cms. Can it be reasonably regarded as a sample from a large population whose mean is 5 cms and whose variance is 4 cms ?

(Given : Critical value of z at 5% L.O.S. for two tailed test is 1.96). **3**

c) Six dice are thrown 729 times. How many times do you expect atleast three dice to show a 5 or 6 ? **3**

9. a) Weights of 4000 students are found to be normally distributed with mean 50 kg and standard deviation 5 kgs. Find the number of students with weights (i) less than 45 kgs (ii) between 45 and 60 kgs. (Given : For a S.M.V.Z. area under the curve between z = 0 and z = 1 is 0.3413 and that between z = 0 and z = 2 is 0.4772). **3**

OR

a) Evaluate $\int_{1-i}^{2+i} (2x + iy + 1) dz$ along the straight line joining 1 – i to 2 + i. **3**

b) In a sampling the mean number of defective bolts manufactured by a machine in a sample of 20 is 2. Determine the expected number of samples out of such 500 samples to contain atleast 2 defective bolts. **3**

c) The average of marks scored by 32 boys is 72 with standard deviation 8 while that of 36 girls is 70 with standard deviation 6. Test at 1% level of significance whether the boys perform better than the girls.

(Given : Critical value of z at 1% L.O.S. for two tailed test = 2.58). **3**

SLR-VB – 81

Seat No.	

Set **S**

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 6-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
*2) Use of calculator and statistical tables are **allowed**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) A random variable X has a Poisson distribution with mean 6, then P(X = 1) =
a) 0.015 b) 0.055 c) 0.15 d) 0.25

2) Accepting null hypothesis when it is false, such error is called
a) Error of type I b) Error of type III
c) Error of type II d) None of these

3) When sample size is less than 30 and population standard deviation σ is known, then which of the following test is selected ?
a) z-test b) χ^2-test c) t-test d) none of these

4) For testing hypothesis using left tailed test null hypothesis is rejected when
a) $z = z_\alpha$ b) $z > z_\alpha$ c) $z < z_\alpha$ d) none of these

5) χ^2-distribution is defined by
a) $\Sigma\frac{(O-E)}{E^2}$ b) $\Sigma\frac{(O-E)}{E}$
c) $\Sigma\left(\frac{O-E}{E}\right)^2$ d) $\Sigma\frac{(O-E)^2}{E}$

6) $\frac{1}{D^2+9}\cos 3x$ is equal to
a) $\frac{x}{3}\cos 3x$ b) $\frac{x}{6}\sin 3x$ c) $\frac{x}{3}\sin 3x$ d) $\frac{-x}{3}\sin 3x$

P.T.O.

7) $\frac{1}{D-a}x$ is equal to

a) $\int xe^{ax}dx$ b) $\int xe^{-ax}dx$ c) $e^{-ax}\int xe^{ax}dx$ d) $e^{ax}\int e^{-ax}xdx$

8) The solution of $x^2\frac{d^2y}{dx^2}+x\frac{dy}{dx}=0$ is y =

a) $C_1 + C_2$ b) $C_1 + C_2e^{-z}$
c) $C_1 + C_2e^{-x}$ d) $C_1 + C_2\log x$

9) If $\vec{r}$ is the position vector, then $\text{div}\,\vec{F}$ =

a) 3 b) 2 c) 1 d) 0

10) For a vector function $\vec{F}$ there exists a scalar potential when

a) $\text{div}\,\vec{F}=0$ b) $\text{grad}(\text{div}\,\vec{F})=0$

c) $\vec{F}.\text{curl}\vec{F}=0$ d) $\text{curl}\vec{F}=0$

11) The solution of $q = 3p^2$ is

a) $z = ax + 3a^2y + c$ b) $z = 3ax + a^2y + c$

c) $z = 3ax^2 + by$ d) $z = ax + \frac{a^2}{3}y + c$

12) The solution of $px^2 + qy^2 = z^2$ is

a) $\phi(x + y + z, x - y - z) = 0$ b) $\phi\left(\frac{1}{x}-\frac{1}{y},\frac{1}{y}-\frac{1}{z}\right)=0$

c) $\phi(x^2 + y^2 + z^2, xyz) = 0$ d) None of these

13) The value of integral $\int_0^{1+i} z^2dz$ along the line y = x is equal to

a) $\frac{2}{3}(1-i)$ b) $\frac{2}{3}(i-1)$ c) $\frac{2}{3}(1+i)$ d) $\frac{2}{3}$

14) The variance of binomial distribution is

a) np b) nq c) npq d) pq

SLR-VB – 81

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
ENGINEERING MATHEMATICS – III

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*
*2) Use of calculator and statistical tables are **allowed**.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Solve $(D^3 + 1)y = 65\cos(2x + 1)$. **3**

b) Solve $\frac{d^3y}{dx^3} + 2\frac{d^2y}{dx^2} + \frac{dy}{dx} = x^3$. **3**

c) Solve $(D^2 - 2D + 5)y = e^{2x}\sin x$. **3**

3. a) The differential equation of a body projected upward in a resisting medium is given by $\frac{d^2s}{dt^2} + k\frac{ds}{dt} = -g$.

If t = 0, s = 0 and $\frac{ds}{dt} = v_0$, show that $s = \left(\frac{g}{k^2} + \frac{v_0}{k}\right)(1 - e^{-kt}) - \frac{gt}{k}$. **5**

b) Solve $(3x + 2)^2\frac{d^2y}{dx^2} + 3(3x + 2)\frac{dy}{dx} - 36y = 8x^2 + 4x + 1$. **4**

OR

b) Solve $x^2\frac{d^2y}{dx^2} - 2x\frac{dy}{dx} + 2y = \frac{1}{x^2}$. **4**

4. a) Solve $xq = yp + xe^{x^2+y^2}$. **3**

b) Solve $z^2(p^2 + q^2) = x + y$. **3**

c) Use variable separable method to solve $4\frac{\partial z}{\partial x} + \frac{\partial z}{\partial y} = 3z$, given $z(0, y) = 2e^{5y}$. **4**

5. a) A particle moves along the curve $\vec{r} = e^{-t}\cos t\,\hat{i} + e^{-t}\sin t\,\hat{j} + e^{-t}\hat{k}$. Find the velocity and acceleration vectors and magnitude of velocity and acceleration at time t. **3**

b) Prove that $r^n\vec{r}$ is irrotational vector, where $\vec{r}$ and r have their usual meaning. **3**

c) Find $\text{div}\,\vec{F}$ and $\text{curl}\,\vec{F}$ if $\vec{F} = \nabla\phi$, where $\phi = x^3 + y^3 + z^3 - 3xyz$. **3**

Set S

SECTION – II

6. a) A die was thrown 132 times and the following frequencies were observed :

Number obtained :	1	2	3	4	5	6	**Total**
Frequency :	15	20	25	15	29	28	**132**

Test the hypothesis that the die is unbiased.

(Given : Table value of χ^2 at 5% L.O.S. with 5 D.F. = 11.07). **3**

b) Two batches of 12 animals each are given test of inoculation. One batch was inoculated and other was not. The number of dead and surviving animals are given in the following table for both cases. Can the inoculation be regarded as effective against the disease at 5% L.O.S. ?

	Dead	**Surviving**	**Total**
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Not inoculated	8	4	12
Total	10	14	24

(Given : The table value of χ^2 at 1 D.F. = 3.81). **3**

c) Evaluate $\int_C \frac{z+6}{z^2-4} dz$ where C is the circle $|z - 2| = 1$. **3**

7. a) Determine the constants a, b, c, d if $f(z) = x^2 + 2axy + by^2 + i(cx^2 + 2dxy + y^2)$ is analytic. **3**

b) Show that u = cosxcoshy is a harmonic function, find its harmonic conjugate. **3**

c) Mine items of a sample had the following values :

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Does the mean of 9 items differ significantly from the assumed population mean 47.5 ?

(Given : Critical value of t for two tailed test at 5% L.O.S. with 8 D.F. = 2.306). **4**

8. a) A candidate at an election claims that, in a locality 90% voters support him. Verify his claim if in a random sample of 400 voters from a locality, 320 supported him.

(Given : Critical value of z at 5% L.O.S. for two tailed test = 1.96). **3**

b) A random sample of 400 members is found to have a mean of 4.45 cms. Can it be reasonably regarded as a sample from a large population whose mean is 5 cms and whose variance is 4 cms ?

(Given : Critical value of z at 5% L.O.S. for two tailed test is 1.96). **3**

c) Six dice are thrown 729 times. How many times do you expect atleast three dice to show a 5 or 6 ? **3**

9. a) Weights of 4000 students are found to be normally distributed with mean 50 kg and standard deviation 5 kgs. Find the number of students with weights (i) less than 45 kgs (ii) between 45 and 60 kgs. (Given : For a S.M.V.Z. area under the curve between z = 0 and z = 1 is 0.3413 and that between z = 0 and z = 2 is 0.4772). **3**

OR

a) Evaluate $\int_{1-i}^{2+i} (2x + iy + 1) dz$ along the straight line joining 1 – i to 2 + i. **3**

b) In a sampling the mean number of defective bolts manufactured by a machine in a sample of 20 is 2. Determine the expected number of samples out of such 500 samples to contain atleast 2 defective bolts. **3**

c) The average of marks scored by 32 boys is 72 with standard deviation 8 while that of 36 girls is 70 with standard deviation 6. Test at 1% level of significance whether the boys perform better than the girls.

(Given : Critical value of z at 1% L.O.S. for two tailed test = 2.58). **3**

SLR-VB – 82

Seat No.	

Set **P**

S.E. (Mech.) (Part – I) Examination, 2017
MACHINE TOOLS AND PROCESSES (CGPA)

Day and Date : Monday, 8-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **All** the answers must write in the answer sheet.*
*4) Only **correct** answer will be given **full** marks.*
*5) There is no negative marking for **any** question.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) Match the appropriate pairs **3**

Column – I	Column – II
A) Automatic bar feeding	p) Drilling Machine
B) Split Nut mechanism	q) Capstan Lathe
C) Indexing head	r) Centre Lathe
	s) Milling machine

2) In orthogonal cutting, cutting edge set at an angle _____ to the direction of relative motion of the tool and work piece. **1**

A) 90° B) 45°
C) 30° D) None of the above

3) Jig and fixture, press tool die can be accurate manufactured by using **1**

A) Centre lathe B) Planning machine
C) EDM wire cut D) Shaping machine

4) Internal gears are made by using **1**

A) Hobbing B) Broaching
C) Shaping with rack cutter D) None of the above

P.T.O.

5) Key way operation can be done by using **1**

A) Slotting Machine B) Lathe machine

C) Hacksaw Machine D) Bandsaw machine

6) The main purpose of boring machine is **1**

A) Drill a hole B) Enlarge existing hole

C) Making tap drill size D) None of the above

7) In Electro Discharge Machining (EDM) the tool is made of **1**

A) Copper B) H.S.S. C) Cast Iron D) Tool Steel

8) Climb milling is chosen while machining because **1**

A) Chip thickness increases gradually

B) Power consumption is reduced

C) Better surface finish

D) None of the above

9) A grinding wheel A24K7V is specified in which K stands for **1**

A) Abrasive B) Grain size C) Grade D) Structure

10) Size of shaper machine is given by **1**

A) Stroke length B) Motor power

C) Weight of machine D) Table size

11) Which of the following attachment are used on centre lathe ? **1**

A) Taper turning B) Dividing head

C) Rotary table D) None of the above

12) What is the material removal mechanism in electrochemical machining ? **1**

A) Electrolysis B) Indentation

C) Melting and vaporization D) Electrodeposition

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SLR-VB – 82

Seat No.	

S.E. (Mech.) (Part – I) Examination, 2017
MACHINE TOOLS AND PROCESSES (CGPA)

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***any three*** *question from* ***each*** *Section.*
2) Draw the ***neat*** *sketches* ***wherever*** *necessary.*
3) Assume suitable data ***if*** *required.*

SECTION – I

2. a) Explain in brief about chip less and chip removal process. **4**
   b) Explain the difference between orthogonal and oblique cutting. **5**

3. a) Calculate the change gears to cut thread of 2 mm pitch on lathe machine having lead screw pitch of 6 mm. **4**
   b) A taper pin of sample length 90 mm has a taper length of 50 mm, the larger diameter of taper is 95 mm and smaller is 85 mm determine **5**
      i) The angle to which the compound rest should be set up
      ii) Tailstock set over.

4. a) Describe how the back gear operates in the centre lathe. **5**
   b) Explain in brief about tool holding devices on drilling machine. **5**

5. Write a short note on **any three** : **(3×3=9)**
   a) Ultrasonic machining
   b) Slotting Machine
   c) Capstan and turret lathe
   d) Radial drilling machine.

SECTION – II

6. a) With a neat sketch explain in brief about horizontal milling machine. **4**
   b) Explain in brief about jig boring machine. **5**

Set P

7. a) Explain in brief about centre less grinding machine. **5**

   b) List the types of milling operations explain with a neat sketches any two operations. **5**

8. a) Index work piece for 87 divisions on milling machine using dividing head by compound indexing. **5**

   Indexing Plate :

   Plate No. 1 : 15, 16, 17, 18, 19, 20

   Plate No. 2 : 21, 23, 27, 29, 31, 33

   Plate No. 3 : 37, 39, 41, 43, 47, 49

   b) To mill 28 teeth on spur gear set the dividing head by simple indexing. **4**

9. Write a short note on **any three** : **(3×3=9)**

   a) CNC machine

   b) Broaching operations

   c) Gear hobbing

   d) Specifications of grinding wheel.

SLR-VB – 82

Seat No.	

Set **Q**

S.E. (Mech.) (Part – I) Examination, 2017
MACHINE TOOLS AND PROCESSES (CGPA)

Day and Date : Monday, 8-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **All** the answers must write in the answer sheet.*
*4) Only **correct** answer will be given **full** marks.*
*5) There is no negative marking for **any** question.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) Size of shaper machine is given by **1**

A) Stroke length B) Motor power
C) Weight of machine D) Table size

2) Which of the following attachment are used on centre lathe ? **1**

A) Taper turning B) Dividing head
C) Rotary table D) None of the above

3) What is the material removal mechanism in electrochemical machining ? **1**

A) Electrolysis B) Indentation
C) Melting and vaporization D) Electrodeposition

4) Match the appropriate pairs **3**

Column – I	Column – II
A) Automatic bar feeding	p) Drilling Machine
B) Split Nut mechanism	q) Capstan Lathe
C) Indexing head	r) Centre Lathe
	s) Milling machine

P.T.O.

5) In orthogonal cutting, cutting edge set at an angle _____ to the direction of relative motion of the tool and work piece. **1**

A) 90° B) 45°

C) 30° D) None of the above

6) Jig and fixture, press tool die can be accurate manufactured by using **1**

A) Centre lathe B) Planning machine

C) EDM wire cut D) Shaping machine

7) Internal gears are made by using **1**

A) Hobbing B) Broaching

C) Shaping with rack cutter D) None of the above

8) Key way operation can be done by using **1**

A) Slotting Machine B) Lathe machine

C) Hacksaw Machine D) Bandsaw machine

9) The main purpose of boring machine is **1**

A) Drill a hole B) Enlarge existing hole

C) Making tap drill size D) None of the above

10) In Electro Discharge Machining (EDM) the tool is made of **1**

A) Copper B) H.S.S. C) Cast Iron D) Tool Steel

11) Climb milling is chosen while machining because **1**

A) Chip thickness increases gradually

B) Power consumption is reduced

C) Better surface finish

D) None of the above

12) A grinding wheel A24K7V is specified in which K stands for **1**

A) Abrasive B) Grain size C) Grade D) Structure

_____

SLR-VB – 82

Seat No.	

S.E. (Mech.) (Part – I) Examination, 2017
MACHINE TOOLS AND PROCESSES (CGPA)

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***any three*** *question from* ***each*** *Section.*
2) Draw the ***neat*** *sketches* ***wherever*** *necessary.*
3) Assume suitable data ***if*** *required.*

SECTION – I

2. a) Explain in brief about chip less and chip removal process. **4**
   b) Explain the difference between orthogonal and oblique cutting. **5**

3. a) Calculate the change gears to cut thread of 2 mm pitch on lathe machine having lead screw pitch of 6 mm. **4**
   b) A taper pin of sample length 90 mm has a taper length of 50 mm, the larger diameter of taper is 95 mm and smaller is 85 mm determine **5**
      i) The angle to which the compound rest should be set up
      ii) Tailstock set over.

4. a) Describe how the back gear operates in the centre lathe. **5**
   b) Explain in brief about tool holding devices on drilling machine. **5**

5. Write a short note on **any three** : **(3×3=9)**
   a) Ultrasonic machining
   b) Slotting Machine
   c) Capstan and turret lathe
   d) Radial drilling machine.

SECTION – II

6. a) With a neat sketch explain in brief about horizontal milling machine. **4**
   b) Explain in brief about jig boring machine. **5**

Set Q

7. a) Explain in brief about centre less grinding machine. **5**

   b) List the types of milling operations explain with a neat sketches any two operations. **5**

8. a) Index work piece for 87 divisions on milling machine using dividing head by compound indexing. **5**

   Indexing Plate :

   Plate No. 1 : 15, 16, 17, 18, 19, 20

   Plate No. 2 : 21, 23, 27, 29, 31, 33

   Plate No. 3 : 37, 39, 41, 43, 47, 49

   b) To mill 28 teeth on spur gear set the dividing head by simple indexing. **4**

9. Write a short note on **any three** : **(3×3=9)**

   a) CNC machine

   b) Broaching operations

   c) Gear hobbing

   d) Specifications of grinding wheel.

SLR-VB – 82

Seat No.	

Set **R**

S.E. (Mech.) (Part – I) Examination, 2017
MACHINE TOOLS AND PROCESSES (CGPA)

Day and Date : Monday, 8-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **All** the answers must write in the answer sheet.*
*4) Only **correct** answer will be given **full** marks.*
*5) There is no negative marking for **any** question.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) In Electro Discharge Machining (EDM) the tool is made of **1**
A) Copper B) H.S.S. C) Cast Iron D) Tool Steel

2) Climb milling is chosen while machining because **1**
A) Chip thickness increases gradually
B) Power consumption is reduced
C) Better surface finish
D) None of the above

3) A grinding wheel A24K7V is specified in which K stands for **1**
A) Abrasive B) Grain size C) Grade D) Structure

4) Size of shaper machine is given by **1**
A) Stroke length B) Motor power
C) Weight of machine D) Table size

5) Which of the following attachment are used on centre lathe ? **1**
A) Taper turning B) Dividing head
C) Rotary table D) None of the above

P.T.O.

6) What is the material removal mechanism in electrochemical machining ? **1**

A) Electrolysis B) Indentation

C) Melting and vaporization D) Electrodeposition

7) Match the appropriate pairs **3**

Column – I	Column – II
A) Automatic bar feeding	p) Drilling Machine
B) Split Nut mechanism	q) Capstan Lathe
C) Indexing head	r) Centre Lathe
	s) Milling machine

8) In orthogonal cutting, cutting edge set at an angle _____ to the direction of relative motion of the tool and work piece. **1**

A) 90° B) 45°

C) 30° D) None of the above

9) Jig and fixture, press tool die can be accurate manufactured by using **1**

A) Centre lathe B) Planning machine

C) EDM wire cut D) Shaping machine

10) Internal gears are made by using **1**

A) Hobbing B) Broaching

C) Shaping with rack cutter D) None of the above

11) Key way operation can be done by using **1**

A) Slotting Machine B) Lathe machine

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12) The main purpose of boring machine is **1**

A) Drill a hole B) Enlarge existing hole

C) Making tap drill size D) None of the above

_____

SLR-VB – 82

Seat No.	

S.E. (Mech.) (Part – I) Examination, 2017
MACHINE TOOLS AND PROCESSES (CGPA)

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***any three*** *question from* ***each*** *Section.*
2) Draw the ***neat*** *sketches* ***wherever*** *necessary.*
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SECTION – I

2. a) Explain in brief about chip less and chip removal process. **4**
   b) Explain the difference between orthogonal and oblique cutting. **5**

3. a) Calculate the change gears to cut thread of 2 mm pitch on lathe machine having lead screw pitch of 6 mm. **4**
   b) A taper pin of sample length 90 mm has a taper length of 50 mm, the larger diameter of taper is 95 mm and smaller is 85 mm determine **5**
      i) The angle to which the compound rest should be set up
      ii) Tailstock set over.

4. a) Describe how the back gear operates in the centre lathe. **5**
   b) Explain in brief about tool holding devices on drilling machine. **5**

5. Write a short note on **any three** : **(3×3=9)**
   a) Ultrasonic machining
   b) Slotting Machine
   c) Capstan and turret lathe
   d) Radial drilling machine.

SECTION – II

6. a) With a neat sketch explain in brief about horizontal milling machine. **4**
   b) Explain in brief about jig boring machine. **5**

Set R

7. a) Explain in brief about centre less grinding machine. **5**

   b) List the types of milling operations explain with a neat sketches any two operations. **5**

8. a) Index work piece for 87 divisions on milling machine using dividing head by compound indexing. **5**

   Indexing Plate :

   Plate No. 1 : 15, 16, 17, 18, 19, 20

   Plate No. 2 : 21, 23, 27, 29, 31, 33

   Plate No. 3 : 37, 39, 41, 43, 47, 49

   b) To mill 28 teeth on spur gear set the dividing head by simple indexing. **4**

9. Write a short note on **any three** : **(3×3=9)**

   a) CNC machine

   b) Broaching operations

   c) Gear hobbing

   d) Specifications of grinding wheel.

———————————

SLR-VB – 82

Seat No.	

Set **S**

S.E. (Mech.) (Part – I) Examination, 2017
MACHINE TOOLS AND PROCESSES (CGPA)

Day and Date : Monday, 8-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) ***All*** *the answers must write in the answer sheet.*
4) Only ***correct*** *answer will be given* ***full*** *marks.*
5) There is no negative marking for ***any*** *question.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) Internal gears are made by using **1**
   A) Hobbing B) Broaching
   C) Shaping with rack cutter D) None of the above

2) Key way operation can be done by using **1**
   A) Slotting Machine B) Lathe machine
   C) Hacksaw Machine D) Bandsaw machine

3) The main purpose of boring machine is **1**
   A) Drill a hole B) Enlarge existing hole
   C) Making tap drill size D) None of the above

4) In Electro Discharge Machining (EDM) the tool is made of **1**
   A) Copper B) H.S.S. C) Cast Iron D) Tool Steel

5) Climb milling is chosen while machining because **1**
   A) Chip thickness increases gradually
   B) Power consumption is reduced
   C) Better surface finish
   D) None of the above

6) A grinding wheel A24K7V is specified in which K stands for **1**

A) Abrasive B) Grain size C) Grade D) Structure

7) Size of shaper machine is given by **1**

A) Stroke length B) Motor power

C) Weight of machine D) Table size

8) Which of the following attachment are used on centre lathe ? **1**

A) Taper turning B) Dividing head

C) Rotary table D) None of the above

9) What is the material removal mechanism in electrochemical machining ? **1**

A) Electrolysis B) Indentation

C) Melting and vaporization D) Electrodeposition

10) Match the appropriate pairs **3**

Column – I	Column – II
A) Automatic bar feeding	p) Drilling Machine
B) Split Nut mechanism	q) Capstan Lathe
C) Indexing head	r) Centre Lathe
	s) Milling machine

11) In orthogonal cutting, cutting edge set at an angle _____ to the direction of relative motion of the tool and work piece. **1**

A) 90° B) 45°

C) 30° D) None of the above

12) Jig and fixture, press tool die can be accurate manufactured by using **1**

A) Centre lathe B) Planning machine

C) EDM wire cut D) Shaping machine

_____

SLR-VB – 82

Seat No.	

S.E. (Mech.) (Part – I) Examination, 2017
MACHINE TOOLS AND PROCESSES (CGPA)

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***any three*** *question from* ***each*** *Section.*
2) Draw the ***neat*** *sketches* ***wherever*** *necessary.*
3) Assume suitable data ***if*** *required.*

SECTION – I

2. a) Explain in brief about chip less and chip removal process. **4**
   b) Explain the difference between orthogonal and oblique cutting. **5**

3. a) Calculate the change gears to cut thread of 2 mm pitch on lathe machine having lead screw pitch of 6 mm. **4**
   b) A taper pin of sample length 90 mm has a taper length of 50 mm, the larger diameter of taper is 95 mm and smaller is 85 mm determine **5**
      i) The angle to which the compound rest should be set up
      ii) Tailstock set over.

4. a) Describe how the back gear operates in the centre lathe. **5**
   b) Explain in brief about tool holding devices on drilling machine. **5**

5. Write a short note on **any three** : **(3×3=9)**
   a) Ultrasonic machining
   b) Slotting Machine
   c) Capstan and turret lathe
   d) Radial drilling machine.

SECTION – II

6. a) With a neat sketch explain in brief about horizontal milling machine. **4**
   b) Explain in brief about jig boring machine. **5**

Set S

7. a) Explain in brief about centre less grinding machine. **5**

   b) List the types of milling operations explain with a neat sketches any two operations. **5**

8. a) Index work piece for 87 divisions on milling machine using dividing head by compound indexing. **5**

   Indexing Plate :

   Plate No. 1 : 15, 16, 17, 18, 19, 20

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   Plate No. 3 : 37, 39, 41, 43, 47, 49

   b) To mill 28 teeth on spur gear set the dividing head by simple indexing. **4**

9. Write a short note on **any three** : **(3×3=9)**

   a) CNC machine

   b) Broaching operations

   c) Gear hobbing

   d) Specifications of grinding wheel.

———————————

SLR-VB – 83

Seat No.	

Set **P**

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MACHINE DRAWING

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 7.00 p.m.

***Note** : 1) Question No. **1** and **2** are **compulsory**.*
*2) Out of Question No. **3** to **6**, attempt **any three**.*
*3) **Assume** suitable dimensions **if not** given.*
*4) **Use** first angle method of projections.*
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

Type – I : Match the pairs (**Each** bit **one** mark **each**) :

Column – A Roughness Grade Number	Column – B Roughness values Ra in Microns
A. N11	P. 0.1
B. N6	Q. 0.8
C. N3	R. 25

Type – II : Correct OR Incorrect (Attempt **any two**) (**Each** bit **one** mark **each**) :

A) Basic shaft is having upper deviation zero.

B) In split muff coupling the number of bolts will always be odd.

C) Auxiliary Inclined Plane (A. I. P.) is always perpendicular to Vertical Plane (V. P.)

Type – III : Multiple correct ans. type (**Each** correct bit **2** marks **each**)

A) In bushed journal bearing bush usually made of soft material such as _____

p) cast Iron
q) brass
r) bronze
s) linoleum

B) Cap nuts are used in _____

p) smoke boxes
q) steam pipe connections
r) inspection cover
s) none of the above

Type – IV : Straight Objective Type/Classical MCQ (**Each** bit **one** mark **each**) :

A) _____ is a IS-code for conventional representation of gears on technical drawing.

a) IS 813-1986
b) IS 10717-1983
c) IS 10716-1983
d) None of the above

B) Standard sheet size of A2 is having width _____ mm and length _____ mm.

a) 420, 594
b) 594, 420
c) 297, 420
d) 420, 297

C) In solid flanged coupling, the flanges are joined by means of _____

a) Hex. headed bolts
b) Headless taper bolts
c) Cotter pin
d) Rivets

D) Journal bearings can support only _____

a) Axial loads
b) Radial loads
c) Inclined loads
d) None of the above

E) $70^{+0.10}_{+0.00}$ is example of _____ tolerance.

a) Unilateral
b) Bilateral
c) Geometrical
d) None of the above

_____

SLR-VB – 83

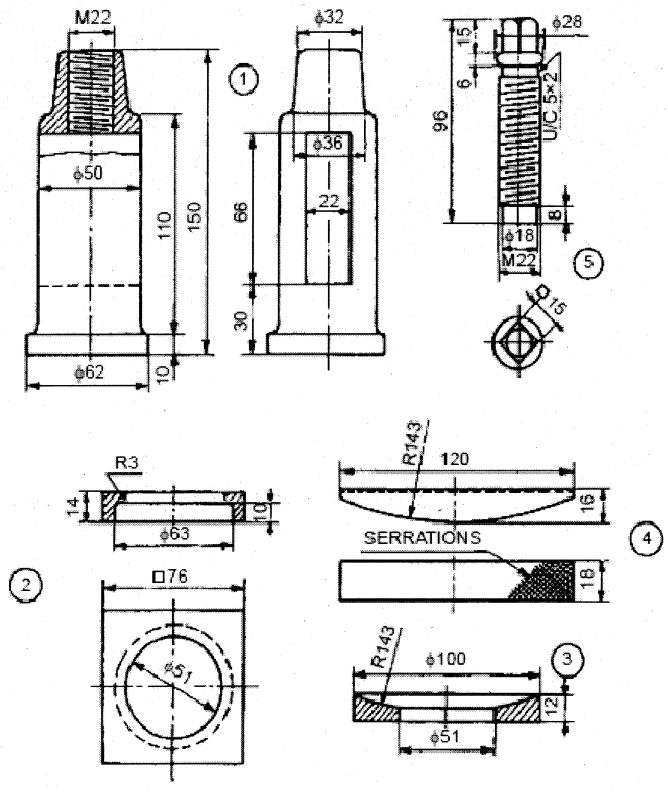
Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MACHINE DRAWING

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 3.00 p.m. to 7.00 p.m.

***Note** : 1) Question No. **1** and **2** are **compulsory**.*
*2) Out of Question No. **3** to **6**, attempt **any three**.*
*3) **Assume** suitable dimensions if not given.*
*4) **Use** first angle method of projections.*

2. Figure 1 shows the details of SINGLE TOOL POST. Draw the assembly of the same showing following views : **23**
1) Sectional front view and 2) Left Hand Side View.
Assume Part No. 06 as a SPACER made up of M.S. having dimensions as, Outer diameter = 100 mm, Inner hole diameter = 51 mm and thickness = 20 mm.



Parts list

No.	Name	Matl	Qty
1	Piller	MCS	1
2	Block	MCS	1
3	Ring	MS	1
4	Wedge	MCS	1
5	Screw	TS	1

Figure 1

Set P

3. A) Draw the B.I.S. conventions for the following (**any three**) : **6**
   i) Concrete
   ii) Straight knurling
   iii) Chain Dimensioning
   iv) Single butt weld.

   B) Draw freehand sketching for the following (**any one**) : **5**
   i) ACME Thread ii) Foot step bearing.

4. a) Show how to dimension following features (**any two**) : **4**
   i) Diameters
   ii) Across Flat
   iii) Countersunk.

   b) Draw the freehand sketching of (**any one**) : **7**
   i) Double riveted, zigzag joint
   ii) Rag Foundation bolt.

5. Solve the following :

   a) Draw representation for (**any one**) : **3**
   i) Shaft basis system ii) Hole basis system.

   b) Redraw the given views of Figure 2 and show the following tolerance symbols on it. **8**
   i) Surface A to be milled to surface finish of one triangle.
   ii) Dimensions 16 and 43 to have bilateral tolerance of – 0.3 mm.
   iii) Surface A to be flat within 0.02 mm.
   iv) Removal of material at surface C is prohibited.

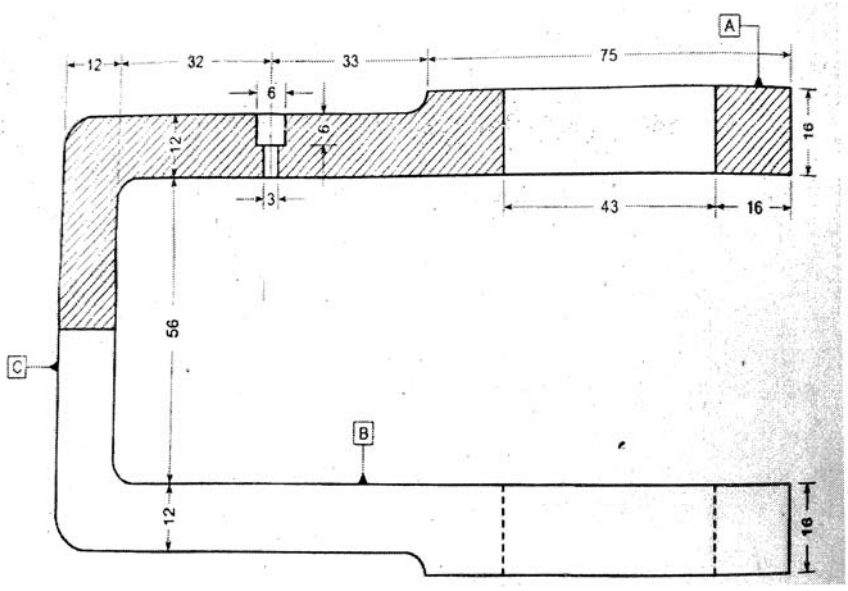


Figure 2

6. Fig. 3 shows two views of an object. Redraw the given views and draw the auxiliary view of the object. **11**

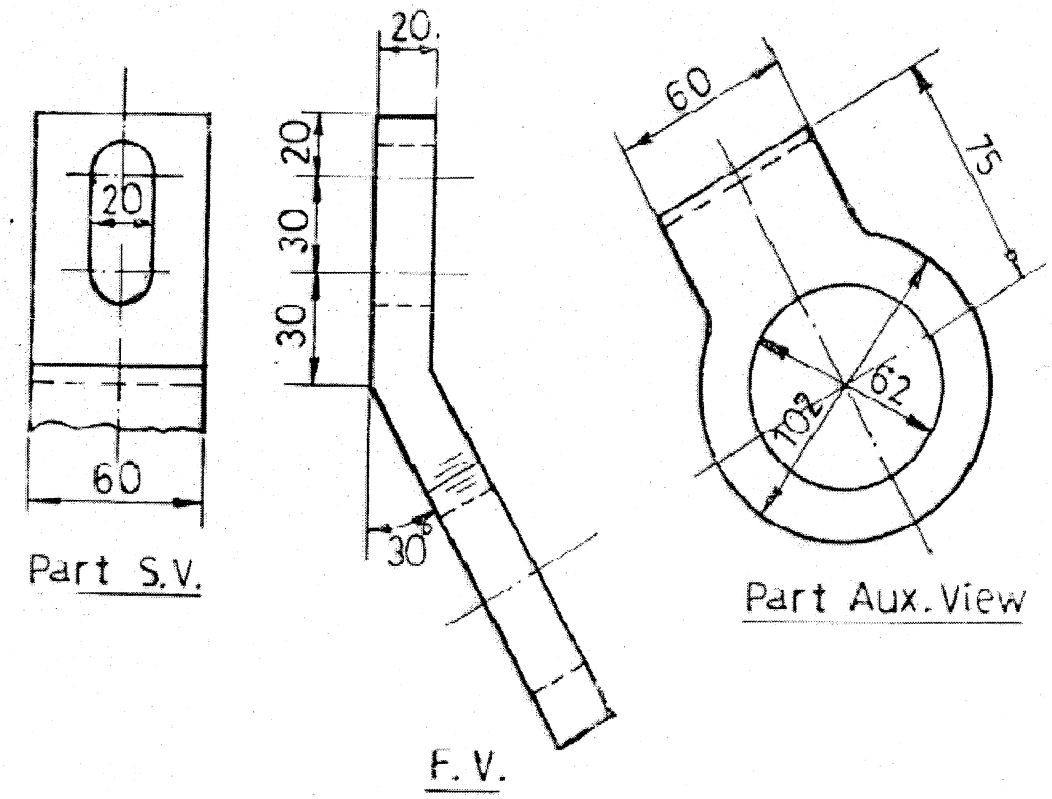


Figure 3

Set P

SLR-VB – 83

Seat No.	

Set Q

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MACHINE DRAWING

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 7.00 p.m.

Note : *1) Question No.* ***1*** *and* ***2*** *are* ***compulsory****.*
2) Out of Question No. ***3*** *to* ***6****, attempt* ***any three****.*
3) ***Assume*** *suitable dimensions* ***if not*** *given.*
4) ***Use*** *first angle method of projections.*
5) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*
6) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

Type – I : Straight Objective Type/Classical MCQ (**Each** bit **one** mark **each**) :

A) _____ is a IS-code for conventional representation of gears on technical drawing.
a) IS 813-1986 b) IS 10717-1983
c) IS 10716-1983 d) None of the above

B) Standard sheet size of A2 is having width _____ mm and length _____ mm.
a) 420, 594 b) 594, 420
c) 297, 420 d) 420, 297

C) In solid flanged coupling, the flanges are joined by means of _____
a) Hex. headed bolts b) Headless taper bolts
c) Cotter pin d) Rivets

D) Journal bearings can support only _____
a) Axial loads b) Radial loads
c) Inclined loads d) None of the above

P.T.O.

E) $70^{+0.10}_{+0.00}$ is example of _____ tolerance.

a) Unilateral b) Bilateral
c) Geometrical d) None of the above

Type – II : Match the pairs (**Each** bit **one** mark **each**) :

Column – A Roughness Grade Number	Column – B Roughness values Ra in Microns
A. N11	P. 0.1
B. N6	Q. 0.8
C. N3	R. 25

Type – III : Correct OR Incorrect (Attempt **any two**) (**Each** bit **one** mark **each**) :

A) Basic shaft is having upper deviation zero.

B) In split muff coupling the number of bolts will always be odd.

C) Auxiliary Inclined Plane (A. I. P.) is always perpendicular to Vertical Plane (V. P.)

Type – IV : Multiple correct ans. type (**Each** correct bit **2** marks **each**)

A) In bushed journal bearing bush usually made of soft material such as _____

p) cast Iron q) brass
r) bronze s) linoleum

B) Cap nuts are used in _____

p) smoke boxes q) steam pipe connections
r) inspection cover s) none of the above

_____

SLR-VB – 83

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MACHINE DRAWING

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 3.00 p.m. to 7.00 p.m.

***Note** : 1) Question No. **1** and **2** are **compulsory**.*
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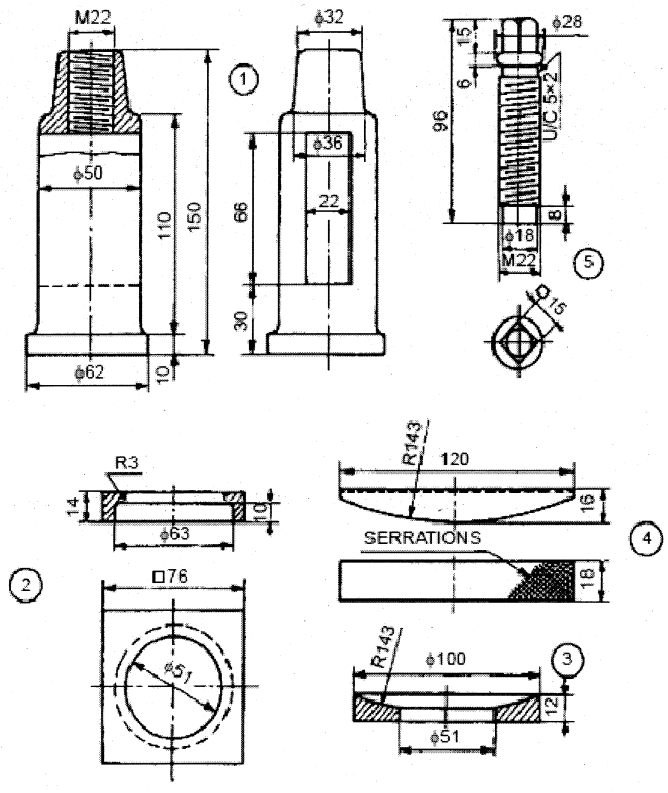

Parts list

No.	Name	Matl	Qty
1	Piller	MCS	1
2	Block	MCS	1
3	Ring	MS	1
4	Wedge	MCS	1
5	Screw	TS	1

Figure 1

3. A) Draw the B.I.S. conventions for the following (**any three**) : **6**
   i) Concrete
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   iv) Single butt weld.

   B) Draw freehand sketching for the following (**any one**) : **5**
   i) ACME Thread ii) Foot step bearing.

4. a) Show how to dimension following features (**any two**) : **4**
   i) Diameters
   ii) Across Flat
   iii) Countersunk.

   b) Draw the freehand sketching of (**any one**) : **7**
   i) Double riveted, zigzag joint
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5. Solve the following :

   a) Draw representation for (**any one**) : **3**
   i) Shaft basis system ii) Hole basis system.

   b) Redraw the given views of Figure 2 and show the following tolerance symbols on it. **8**
   i) Surface A to be milled to surface finish of one triangle.
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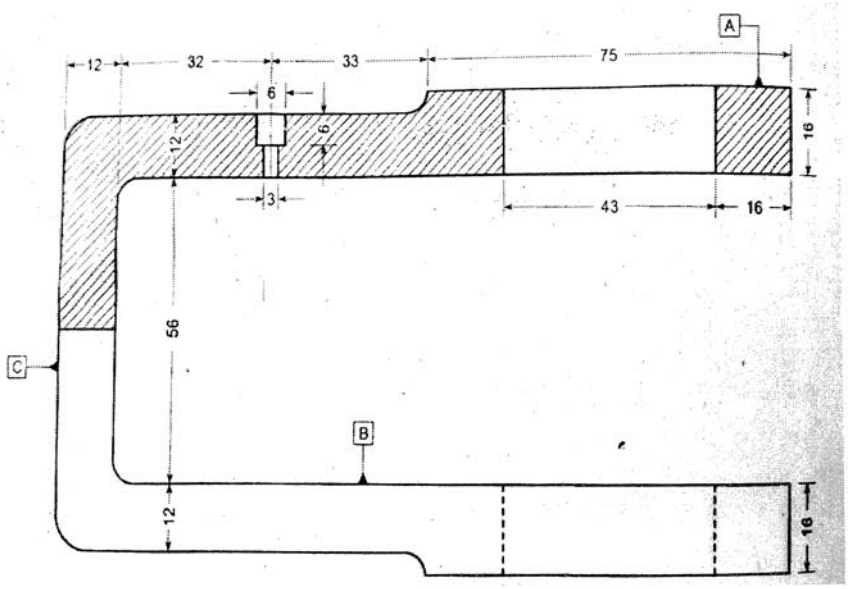

Figure 2

Set Q

6. Fig. 3 shows two views of an object. Redraw the given views and draw the auxiliary view of the object. **11**

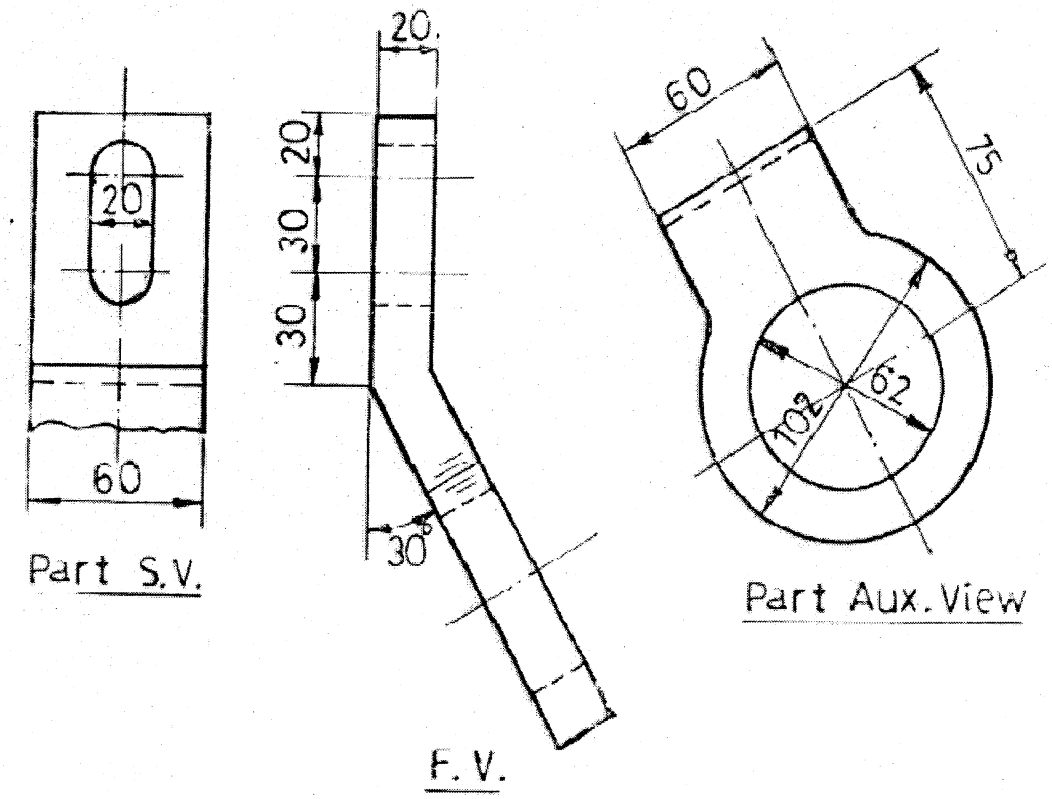

Figure 3

Set Q

SLR-VB – 83

Seat No.	

Set R

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MACHINE DRAWING

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 7.00 p.m.

Note : *1) Question No. **1** and **2** are **compulsory**.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

Type – I : Multiple correct ans. type (**Each** correct bit **2** marks **each**)

A) In bushed journal bearing bush usually made of soft material such as _____

p) cast Iron q) brass
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P.T.O.

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A) Basic shaft is having upper deviation zero.

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_____

SLR-VB – 83

Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MACHINE DRAWING

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 3.00 p.m. to 7.00 p.m.

***Note** : 1) Question No. **1** and **2** are **compulsory**.*
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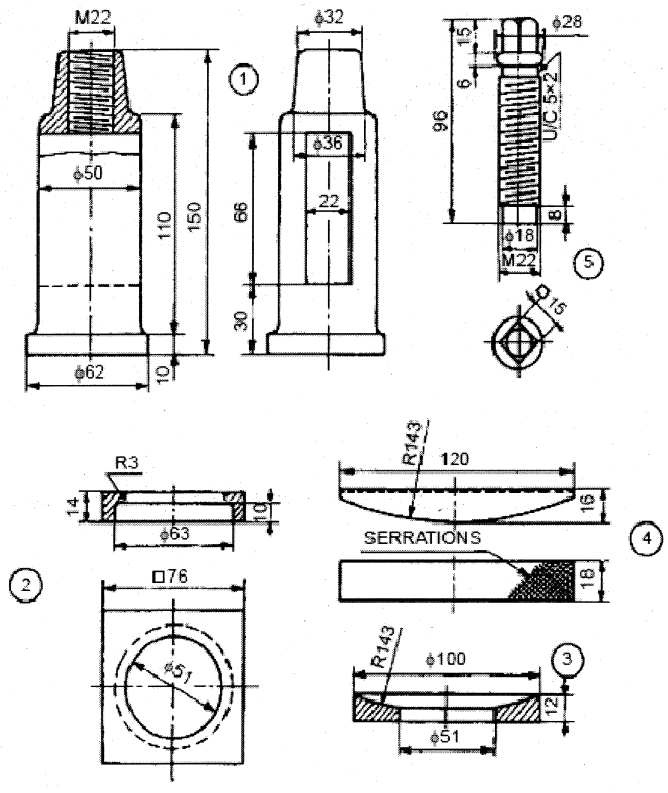

Parts list

No.	Name	Matl	Qty
1	Piller	MCS	1
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Figure 1

3. A) Draw the B.I.S. conventions for the following (**any three**) : **6**
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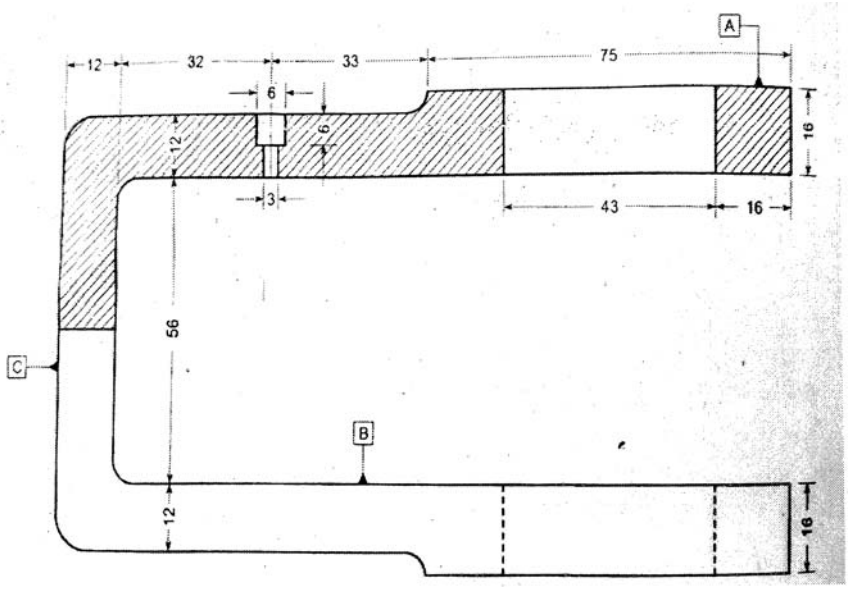

Figure 2

6. Fig. 3 shows two views of an object. Redraw the given views and draw the auxiliary view of the object. **11**

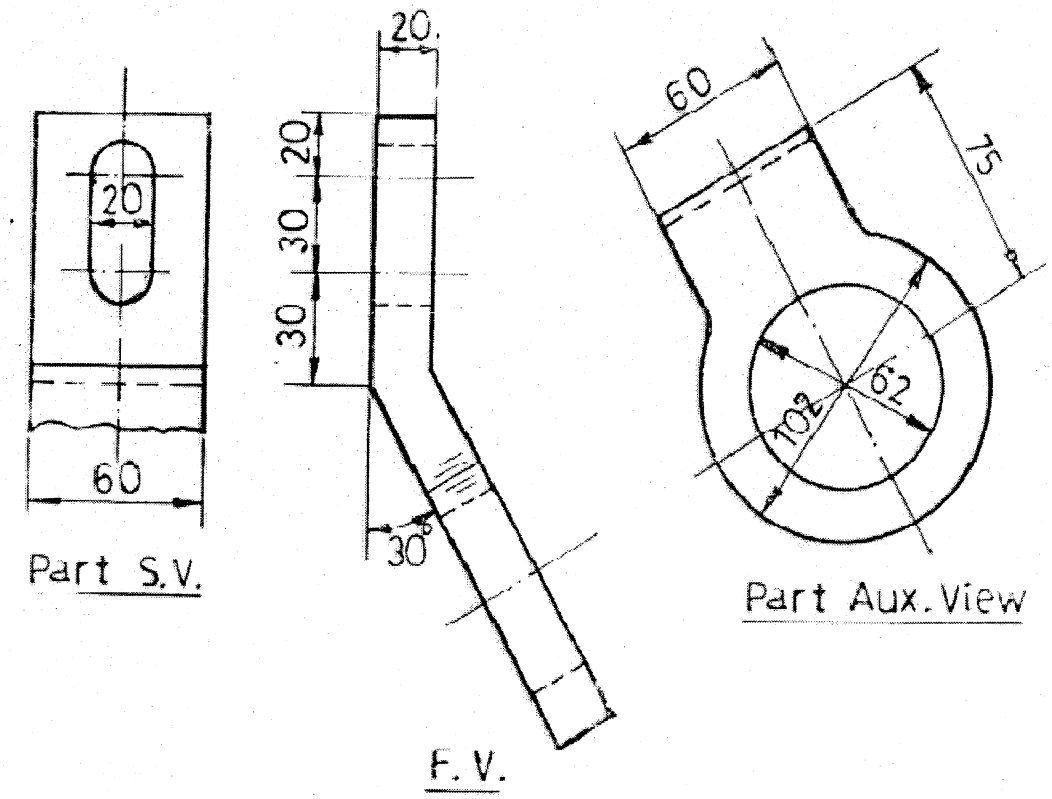

Figure 3

Set R

SLR-VB – 83

Seat No.	

Set S

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MACHINE DRAWING

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 7.00 p.m.

Note : *1) Question No.* ***1*** *and* ***2*** *are* ***compulsory****.*
2) Out of Question No. ***3*** *to* ***6****, attempt* ***any three****.*
3) ***Assume*** *suitable dimensions* ***if not*** *given.*
4) ***Use*** *first angle method of projections.*
5) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

Type – I : Correct OR Incorrect (Attempt **any two**) (**Each** bit **one** mark **each**) :

A) Basic shaft is having upper deviation zero.

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C) Auxiliary Inclined Plane (A. I. P.) is always perpendicular to Vertical Plane (V. P.)

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r) inspection cover s) none of the above

P.T.O.

Type – III : Straight Objective Type/Classical MCQ (**Each** bit **one** mark **each**) :

A) _____ is a IS-code for conventional representation of gears on technical drawing.
   a) IS 813-1986 b) IS 10717-1983
   c) IS 10716-1983 d) None of the above

B) Standard sheet size of A2 is having width _____ mm and length _____ mm.
   a) 420, 594 b) 594, 420
   c) 297, 420 d) 420, 297

C) In solid flanged coupling, the flanges are joined by means of _____
   a) Hex. headed bolts b) Headless taper bolts
   c) Cotter pin d) Rivets

D) Journal bearings can support only _____
   a) Axial loads b) Radial loads
   c) Inclined loads d) None of the above

E) $70^{+0.10}_{+0.00}$ is example of _____ tolerance.
   a) Unilateral b) Bilateral
   c) Geometrical d) None of the above

Type – IV : Match the pairs (**Each** bit **one** mark **each**) :

Column – A Roughness Grade Number	Column – B Roughness values Ra in Microns
A. N11	P. 0.1
B. N6	Q. 0.8
C. N3	R. 25

_____

SLR-VB – 83

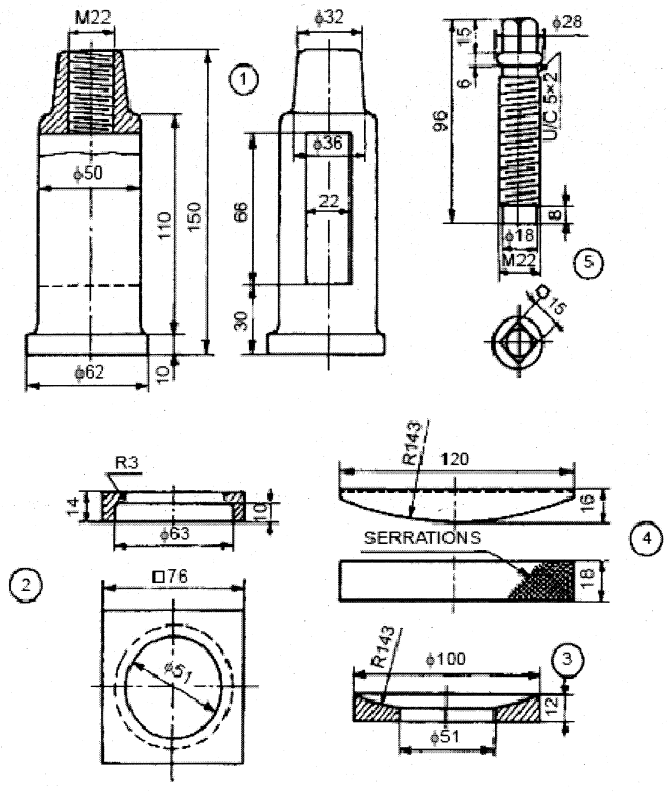
Seat No.	

S.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MACHINE DRAWING

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 3.00 p.m. to 7.00 p.m.

***Note** : 1) Question No. **1** and **2** are **compulsory**.*
*2) Out of Question No. **3** to **6**, attempt **any three**.*
*3) **Assume** suitable dimensions if not given.*
*4) **Use** first angle method of projections.*

2. Figure 1 shows the details of SINGLE TOOL POST. Draw the assembly of the same showing following views : **23**
1) Sectional front view and 2) Left Hand Side View.
Assume Part No. 06 as a SPACER made up of M.S. having dimensions as, Outer diameter = 100 mm, Inner hole diameter = 51 mm and thickness = 20 mm.



Parts list

No.	Name	Matl	Qty
1	Piller	MCS	1
2	Block	MCS	1
3	Ring	MS	1
4	Wedge	MCS	1
5	Screw	TS	1

Figure 1

3. A) Draw the B.I.S. conventions for the following (**any three**) : **6**
   i) Concrete
   ii) Straight knurling
   iii) Chain Dimensioning
   iv) Single butt weld.

   B) Draw freehand sketching for the following (**any one**) : **5**
   i) ACME Thread ii) Foot step bearing.

4. a) Show how to dimension following features (**any two**) : **4**
   i) Diameters
   ii) Across Flat
   iii) Countersunk.

   b) Draw the freehand sketching of (**any one**) : **7**
   i) Double riveted, zigzag joint
   ii) Rag Foundation bolt.

5. Solve the following :

   a) Draw representation for (**any one**) : **3**
   i) Shaft basis system ii) Hole basis system.

   b) Redraw the given views of Figure 2 and show the following tolerance symbols on it. **8**
   i) Surface A to be milled to surface finish of one triangle.
   ii) Dimensions 16 and 43 to have bilateral tolerance of – 0.3 mm.
   iii) Surface A to be flat within 0.02 mm.
   iv) Removal of material at surface C is prohibited.

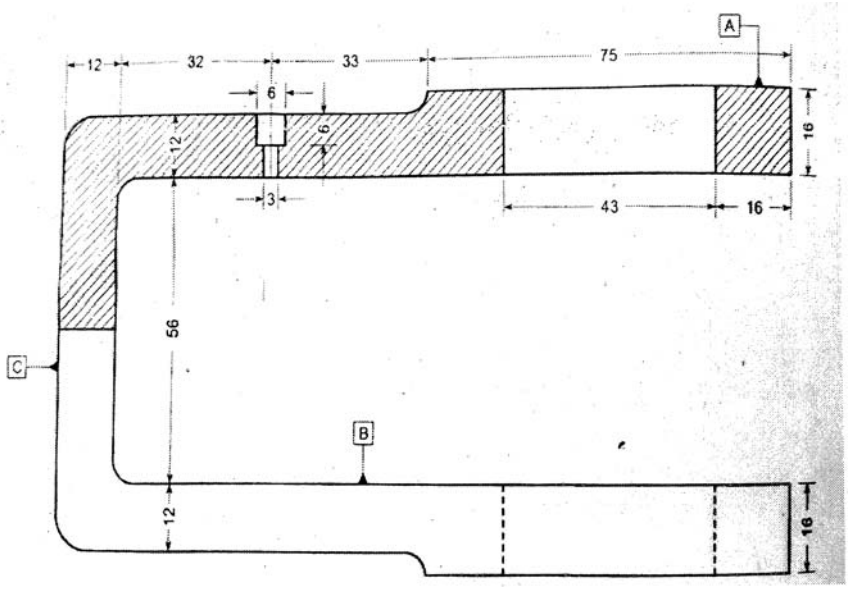


Figure 2

6. Fig. 3 shows two views of an object. Redraw the given views and draw the auxiliary view of the object. **11**

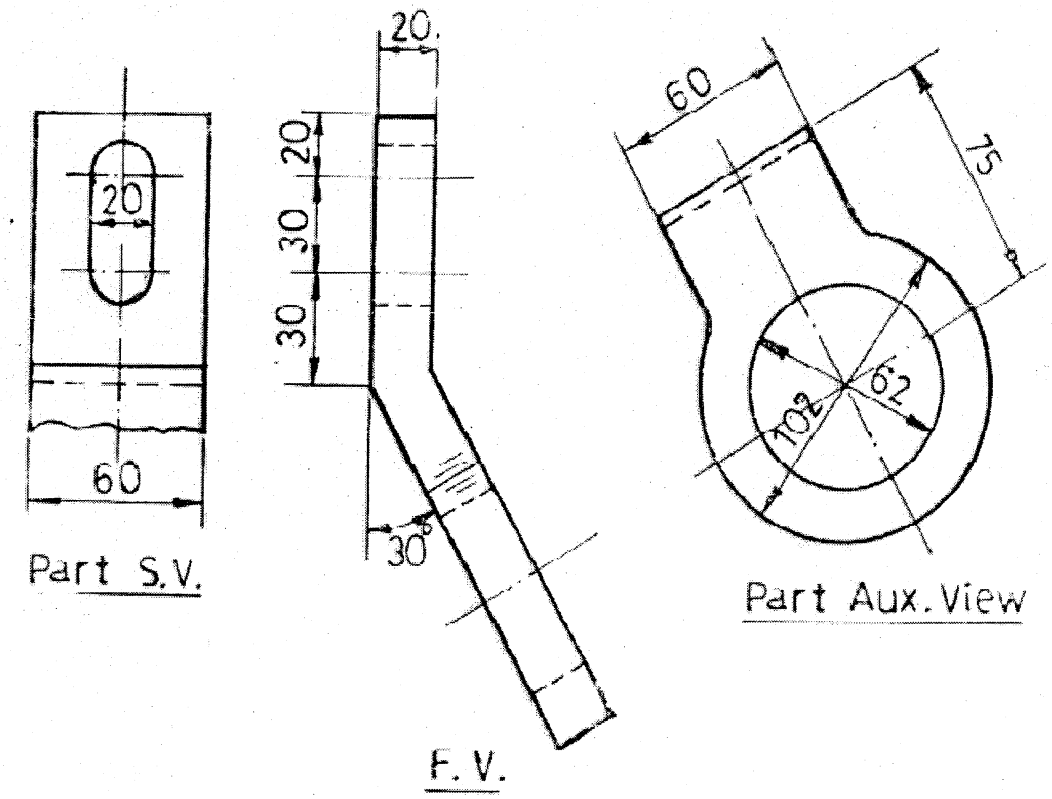


Figure 3

Set S

SLR-VB – 84

Seat No.	

Set P

S.E. (Mech.) (Part – II) (CGPA) Examination, 2017
FLUID MECHANICS

Day and Date : Tuesday, 16-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable ***data*** *if necessary and state it* ***clearly****.*
3) Use of non-programmable calculator is ***allowed****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Solve the following MCQ : **14**

1) The point of application of the force of buoyancy on the body is known as
   a) Metacentre b) Centre of buoyancy
   c) Centre of gravity d) None of these

2) The magnitude of the buoyant force can be determined by
   a) Newton's second law of motion b) Archimedes' principles
   c) Principle of moments d) None of the above

3) If particles of fluid attain such velocities that vary from point to point in magnitude and direction as well as from instant, the flow is
   a) Uniform b) Steady c) Turbulent d) Laminar

4) If ψ is a stream function then the velocity u and v are given by
   a) $u = \partial\psi / \partial x$, $v = -\partial\psi / \partial y$
   b) $u = -\partial\psi / \partial y$, $v = -\partial\psi / \partial y$
   c) $u = \partial\psi / \partial y$, $v = \partial\psi / \partial y$
   d) $u = -\partial\psi / \partial y$, $v = \partial\psi / \partial x$

5) The difference of pressure head (h) measured by mercury-oil differential manometer is given as
   a) $h = x\left[1 - \frac{S_g}{S_o}\right]$ b) $h = x\left[S_g - S_o\right]$
   c) $h = x\left[S_o - S_g\right]$ d) $h = x\left[\frac{S_g}{S_o} - 1\right]$

P.T.O.

6) Eulers equation in differential form is written as

a) $\frac{dp}{\rho} + v^2.dv + g.dz = 0$ b) $\frac{dp}{\rho} + v.dv + g.dz = 0$

c) $\frac{dp}{\rho} + v.dv + g^2.dz = 0$ d) $\frac{dp}{\rho^2} + v.dv + g.dz = 0$

7) The maximum velocity in a circular pipe when flow is laminar occurs at
   a) The top of the pipe b) The bottom of the pipe
   c) The centre of the pipe d) Not necessarily at the centre

8) Loss of head due to sudden enlargement is given as

a) $(V_1 - V_2)^3/2g$ b) $(V_1 - V_2)^2/2g$ c) $(V_1^2 - V_2^2)/2g$ d) $(V_1^3 - V_2^3)/2g$

9) At what value of head lost due to friction in pipe, will the power transmitted through the pipe be maximum ?
   a) $1/2^{nd}$ of the total supply head b) $1/3^{rd}$ of the total supply head
   c) $1/4^{th}$ of the total supply head d) $1/8^{th}$ of the total supply head

10) Darcy-Weisbach equation is used to find loss of head due to
   a) Sudden enlargement b) Sudden contraction
   c) Friction d) None of the above

11) In dimensional analysis the Buckingham's π-theorem is widely used and expresses the resulting equation in terms of
   a) Geometric, kinematic and dynamic variables
   b) The repeating variables
   c) (n-m) dimensionless parameters
   d) n dimensionless parameters

12) The boundary layer exists in which of the following ?
   a) Flow of real fluids b) Flow of ideal fluids
   c) Flow over flat surfaces only d) Pipe flow only

13) The friction drag is primarily due to
   a) Weight component in the direction of flow
   b) Shear stresses generated due to viscous action
   c) Separation of boundary layer
   d) None of these

14) The drag force is given by

a) $C_D \rho U^2 A$ b) $C_D \rho^2 U^2 A$ c) $C_D \rho U^2 A^2$ d) $C_D \frac{\rho U^2}{2} A$

SLR-VB – 84

Seat No.	

S.E. (Mech.) (Part – II) (CGPA) Examination, 2017
FLUID MECHANICS

Day and Date : Tuesday, 16-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable ***data*** *if necessary and state it* ***clearly****.*
3) Use of non-programmable calculator is ***allowed****.*

SECTION – I

2. a) Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid. **5**

   b) The fluid flow is described by the velocity field as given $V = 4x^3i - 10x^2yj + 2tk$.

   Find the velocity and acceleration components at point (2, 1, 3) in the field at t = 1 and total acceleration also. **5**

   c) Explain metacentre and metacentric height. **4**

3. a) Differentiate between Eulerian and Lagrangian description of fluid flow. Which is useful to study ? **5**

   b) What is Venturimeter ? Derive an expression for the discharge through a Venturimeter. **5**

   c) A jet of water issues from a sharp edged vertical orifice under a constant head of 0.51 met. At a certain point of issuing jet, the horizontal and vertical co-ordinates measured from vena-contracta are 0.406 m and 0.085 m. Find the co-efficient C_v if $C_d = 0.62$ and find also C_c. **4**

4. a) A pitot tube is placed at the centre of a 30 cm diameter pipe the static pressure head is 5 m. The stagnation pressure head is 6 m. Calculate rate of flow of water through pipe if the mean (average) velocity of flow is 0.85 times the central velocity. Take co-efficient of tube $C_v = 0.98$. **5**

   b) A crude oil of viscosity of 0.97 poise and relative density 0.9 is flowing through a horizontal circular pipe of diameter 100 mm and of length 10 m. Calculate the difference of pressure at the two ends of the pipe, if 100 kg of the oil is collected in a tank in 30 seconds. **5**

   c) Define the following terms :

   i) Stream line ii) Path line iii) Streak line iv) Laminar flow. **4**

SECTION – II

5. a) What is Siphon ? Where it is used ? Explain its working. **5**

   b) Two tanks whose water surface levels differ by 10 m are connected by three pipes of different diameters 250 mm, 150 mm and 200 mm in series. Their lengths are 300 m, 250 m and 150 m respectively. Their co-efficient of frictions are 0.005, 0.006 and 0.0055 respectively. Find the rate of flow through the pipe considering all losses. **5**

   c) Explain the different losses that occurs in the pipe line connection, with formulae. **4**

6. a) Using Buckinghams π theorem, show that velocity through circular orifice is given by $V = \sqrt{2gh}\,\phi\left[\frac{D}{H}, \frac{\mu}{\rho VH}\right]$

   where H – is head causing flow

   D – Diameter of orifice, μ – Co-efficient of viscosity

   ρ – Mass density, g – Acceleration due to gravity. **5**

   b) Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $\frac{\mu}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$. **5**

   c) Derive an expression for power transmission through pipes. What is the condition for maximum transmission of power ? **4**

7. a) Explain the terms friction drag, pressure drag, streamline body. **5**

   b) A flat plate of dimensions 1.5 m × 1.5 m moves at 50 km/hr in a stationary air of density 1.15 kg/m^3. Given that $C_D = 0.15$ and $C_L = 0.75$. Determine

      1) Drag force
      2) Lift force
      3) Power required to maintain the plate in motion. **5**

   c) Write a short note on CFD. What are the applications of CFD software ? **4**

SLR-VB – 84

Seat No.	

Set Q

S.E. (Mech.) (Part – II) (CGPA) Examination, 2017
FLUID MECHANICS

Day and Date : Tuesday, 16-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
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3) Use of non-programmable calculator is ***allowed****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Solve the following MCQ : **14**

1) Loss of head due to sudden enlargement is given as

a) $(V_1 - V_2)^3/2g$ b) $(V_1 - V_2)^2/2g$ c) $(V_1^2 - V_2^2)/2g$ d) $(V_1^3 - V_2^3)/2g$

2) At what value of head lost due to friction in pipe, will the power transmitted through the pipe be maximum ?

a) $1/2^{nd}$ of the total supply head b) $1/3^{rd}$ of the total supply head
c) $1/4^{th}$ of the total supply head d) $1/8^{th}$ of the total supply head

3) Darcy-Weisbach equation is used to find loss of head due to

a) Sudden enlargement b) Sudden contraction
c) Friction d) None of the above

4) In dimensional analysis the Buckingham's π-theorem is widely used and expresses the resulting equation in terms of

a) Geometric, kinematic and dynamic variables
b) The repeating variables
c) (n-m) dimensionless parameters
d) n dimensionless parameters

5) The boundary layer exists in which of the following ?

a) Flow of real fluids b) Flow of ideal fluids
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P.T.O.

6) The friction drag is primarily due to
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   b) Shear stresses generated due to viscous action
   c) Separation of boundary layer
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   a) $C_D \rho U^2 A$ b) $C_D \rho^2 U^2 A$ c) $C_D \rho U^2 A^2$ d) $C_D \frac{\rho U^2}{2} A$

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   a) $u = \partial\psi / \partial x$, $v = -\partial\psi / \partial y$ b) $u = -\partial\psi / \partial y$, $v = -\partial\psi / \partial y$ c) $u = \partial\psi / \partial y$, $v = \partial\psi / \partial y$ d) $u = -\partial\psi / \partial y$, $v = \partial\psi / \partial x$

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   a) The top of the pipe b) The bottom of the pipe
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SLR-VB – 84

Seat No.	

S.E. (Mech.) (Part – II) (CGPA) Examination, 2017
FLUID MECHANICS

Day and Date : Tuesday, 16-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
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SECTION – I

2. a) Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid. **5**

   b) The fluid flow is described by the velocity field as given $V = 4x^3i - 10x^2yj + 2tk$.

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   b) What is Venturimeter ? Derive an expression for the discharge through a Venturimeter. **5**

   c) A jet of water issues from a sharp edged vertical orifice under a constant head of 0.51 met. At a certain point of issuing jet, the horizontal and vertical co-ordinates measured from vena-contracta are 0.406 m and 0.085 m. Find the co-efficient C_v if $C_d = 0.62$ and find also C_c. **4**

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   b) A crude oil of viscosity of 0.97 poise and relative density 0.9 is flowing through a horizontal circular pipe of diameter 100 mm and of length 10 m. Calculate the difference of pressure at the two ends of the pipe, if 100 kg of the oil is collected in a tank in 30 seconds. **5**

   c) Define the following terms :

   i) Stream line ii) Path line iii) Streak line iv) Laminar flow. **4**

SECTION – II

5. a) What is Siphon ? Where it is used ? Explain its working. **5**

   b) Two tanks whose water surface levels differ by 10 m are connected by three pipes of different diameters 250 mm, 150 mm and 200 mm in series. Their lengths are 300 m, 250 m and 150 m respectively. Their co-efficient of frictions are 0.005, 0.006 and 0.0055 respectively. Find the rate of flow through the pipe considering all losses. **5**

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   where H – is head causing flow

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   b) Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $\frac{\mu}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$. **5**

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   b) A flat plate of dimensions 1.5 m × 1.5 m moves at 50 km/hr in a stationary air of density 1.15 kg/m^3. Given that $C_D = 0.15$ and $C_L = 0.75$. Determine

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      2) Lift force
      3) Power required to maintain the plate in motion. **5**

   c) Write a short note on CFD. What are the applications of CFD software ? **4**

SLR-VB – 84

Seat No.	

Set R

S.E. (Mech.) (Part – II) (CGPA) Examination, 2017
FLUID MECHANICS

Day and Date : Tuesday, 16-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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1) The difference of pressure head (h) measured by mercury-oil differential manometer is given as

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   c) 1/4th of the total supply head
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   c) $u = \partial\psi / \partial y$, $v = \partial\psi / \partial y$
   d) $u = -\partial\psi / \partial y$, $v = \partial\psi / \partial x$

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Seat No.	

S.E. (Mech.) (Part – II) (CGPA) Examination, 2017
FLUID MECHANICS

Day and Date : Tuesday, 16-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
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SECTION – I

2. a) Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid. **5**

   b) The fluid flow is described by the velocity field as given $V = 4x^3i - 10x^2yj + 2tk$.

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   b) What is Venturimeter ? Derive an expression for the discharge through a Venturimeter. **5**

   c) A jet of water issues from a sharp edged vertical orifice under a constant head of 0.51 met. At a certain point of issuing jet, the horizontal and vertical co-ordinates measured from vena-contracta are 0.406 m and 0.085 m. Find the co-efficient C_v if $C_d = 0.62$ and find also C_c. **4**

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   c) Define the following terms :

   i) Stream line ii) Path line iii) Streak line iv) Laminar flow. **4**

SECTION – II

5. a) What is Siphon ? Where it is used ? Explain its working. **5**

   b) Two tanks whose water surface levels differ by 10 m are connected by three pipes of different diameters 250 mm, 150 mm and 200 mm in series. Their lengths are 300 m, 250 m and 150 m respectively. Their co-efficient of frictions are 0.005, 0.006 and 0.0055 respectively. Find the rate of flow through the pipe considering all losses. **5**

   c) Explain the different losses that occurs in the pipe line connection, with formulae. **4**

6. a) Using Buckinghams π theorem, show that velocity through circular orifice is given by $V = \sqrt{2gh}\,\phi\left[\frac{D}{H}, \frac{\mu}{\rho VH}\right]$

   where H – is head causing flow

   D – Diameter of orifice, μ – Co-efficient of viscosity

   ρ – Mass density, g – Acceleration due to gravity. **5**

   b) Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $\frac{\mu}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$. **5**

   c) Derive an expression for power transmission through pipes. What is the condition for maximum transmission of power ? **4**

7. a) Explain the terms friction drag, pressure drag, streamline body. **5**

   b) A flat plate of dimensions 1.5 m × 1.5 m moves at 50 km/hr in a stationary air of density 1.15 kg/m^3. Given that $C_D = 0.15$ and $C_L = 0.75$. Determine

      1) Drag force
      2) Lift force
      3) Power required to maintain the plate in motion. **5**

   c) Write a short note on CFD. What are the applications of CFD software ? **4**

SLR-VB – 84

Seat No.	

Set S

S.E. (Mech.) (Part – II) (CGPA) Examination, 2017
FLUID MECHANICS

Day and Date : Tuesday, 16-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable ***data*** *if necessary and state it* ***clearly****.*
3) Use of non-programmable calculator is ***allowed****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Solve the following MCQ : **14**

1) Darcy-Weisbach equation is used to find loss of head due to
   a) Sudden enlargement b) Sudden contraction
   c) Friction d) None of the above

2) In dimensional analysis the Buckingham's π-theorem is widely used and expresses the resulting equation in terms of
   a) Geometric, kinematic and dynamic variables
   b) The repeating variables
   c) (n-m) dimensionless parameters
   d) n dimensionless parameters

3) The boundary layer exists in which of the following ?
   a) Flow of real fluids b) Flow of ideal fluids
   c) Flow over flat surfaces only d) Pipe flow only

4) The friction drag is primarily due to
   a) Weight component in the direction of flow
   b) Shear stresses generated due to viscous action
   c) Separation of boundary layer
   d) None of these

5) The drag force is given by
   a) $C_D \rho U^2 A$ b) $C_D \rho^2 U^2 A$ c) $C_D \rho U^2 A^2$ d) $C_D \frac{\rho U^2}{2} A$

6) The point of application of the force of buoyancy on the body is known as
   a) Metacentre b) Centre of buoyancy
   c) Centre of gravity d) None of these

7) The magnitude of the buoyant force can be determined by
   a) Newton's second law of motion b) Archimedes' principles
   c) Principle of moments d) None of the above

8) If particles of fluid attain such velocities that vary from point to point in magnitude and direction as well as from instant, the flow is
   a) Uniform b) Steady c) Turbulent d) Laminar

9) If ψ is a stream function then the velocity u and v are given by
   a) $u = \partial\psi / \partial x$, $v = -\partial\psi / \partial y$
   b) $u = -\partial\psi / \partial y$, $v = -\partial\psi / \partial y$
   c) $u = \partial\psi / \partial y$, $v = \partial\psi / \partial y$
   d) $u = -\partial\psi / \partial y$, $v = \partial\psi / \partial x$

10) The difference of pressure head (h) measured by mercury-oil differential manometer is given as
   a) $h = x\left[1 - \frac{S_g}{S_o}\right]$ b) $h = x\left[S_g - S_o\right]$
   c) $h = x\left[S_o - S_g\right]$ d) $h = x\left[\frac{S_g}{S_o} - 1\right]$

11) Eulers equation in differential form is written as
   a) $\frac{dp}{\rho} + v^2.dv + g.dz = 0$ b) $\frac{dp}{\rho} + v.dv + g.dz = 0$
   c) $\frac{dp}{\rho} + v.dv + g^2.dz = 0$ d) $\frac{dp}{\rho^2} + v.dv + g.dz = 0$

12) The maximum velocity in a circular pipe when flow is laminar occurs at
   a) The top of the pipe b) The bottom of the pipe
   c) The centre of the pipe d) Not necessarily at the centre

13) Loss of head due to sudden enlargement is given as
   a) $(V_1 - V_2)^3/2g$ b) $(V_1 - V_2)^2/2g$ c) $(V_1^2 - V_2^2)/2g$ d) $(V_1^3 - V_2^3)/2g$

14) At what value of head lost due to friction in pipe, will the power transmitted through the pipe be maximum ?
   a) 1/2nd of the total supply head b) 1/3rd of the total supply head
   c) 1/4th of the total supply head d) 1/8th of the total supply head

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Seat No.	

S.E. (Mech.) (Part – II) (CGPA) Examination, 2017
FLUID MECHANICS

Day and Date : Tuesday, 16-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
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SECTION – I

2. a) Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid. **5**

   b) The fluid flow is described by the velocity field as given $V = 4x^3i - 10x^2yj + 2tk$.

   Find the velocity and acceleration components at point (2, 1, 3) in the field at t = 1 and total acceleration also. **5**

   c) Explain metacentre and metacentric height. **4**

3. a) Differentiate between Eulerian and Lagrangian description of fluid flow. Which is useful to study ? **5**

   b) What is Venturimeter ? Derive an expression for the discharge through a Venturimeter. **5**

   c) A jet of water issues from a sharp edged vertical orifice under a constant head of 0.51 met. At a certain point of issuing jet, the horizontal and vertical co-ordinates measured from vena-contracta are 0.406 m and 0.085 m. Find the co-efficient C_v if $C_d = 0.62$ and find also C_c. **4**

4. a) A pitot tube is placed at the centre of a 30 cm diameter pipe the static pressure head is 5 m. The stagnation pressure head is 6 m. Calculate rate of flow of water through pipe if the mean (average) velocity of flow is 0.85 times the central velocity. Take co-efficient of tube $C_v = 0.98$. **5**

   b) A crude oil of viscosity of 0.97 poise and relative density 0.9 is flowing through a horizontal circular pipe of diameter 100 mm and of length 10 m. Calculate the difference of pressure at the two ends of the pipe, if 100 kg of the oil is collected in a tank in 30 seconds. **5**

   c) Define the following terms :

   i) Stream line ii) Path line iii) Streak line iv) Laminar flow. **4**

SECTION – II

5. a) What is Siphon ? Where it is used ? Explain its working. **5**

   b) Two tanks whose water surface levels differ by 10 m are connected by three pipes of different diameters 250 mm, 150 mm and 200 mm in series. Their lengths are 300 m, 250 m and 150 m respectively. Their co-efficient of frictions are 0.005, 0.006 and 0.0055 respectively. Find the rate of flow through the pipe considering all losses. **5**

   c) Explain the different losses that occurs in the pipe line connection, with formulae. **4**

6. a) Using Buckinghams π theorem, show that velocity through circular orifice is given by $V = \sqrt{2gh}\,\phi\left[\frac{D}{H}, \frac{\mu}{\rho VH}\right]$

   where H – is head causing flow

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   b) Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $\frac{\mu}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$. **5**

   c) Derive an expression for power transmission through pipes. What is the condition for maximum transmission of power ? **4**

7. a) Explain the terms friction drag, pressure drag, streamline body. **5**

   b) A flat plate of dimensions 1.5 m × 1.5 m moves at 50 km/hr in a stationary air of density 1.15 kg/m^3. Given that $C_D = 0.15$ and $C_L = 0.75$. Determine

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      2) Lift force
      3) Power required to maintain the plate in motion. **5**

   c) Write a short note on CFD. What are the applications of CFD software ? **4**

SLR-VB – 85

Seat No.	

Set **P**

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
THEORY OF MACHINES – I

Day and Date : Thursday, 18-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) In a reciprocating steam engine, which of the following forms a kinematic link ?
   a) Cylinder and piston b) Piston rod and connecting rod
   c) Crank shaft and flywheel d) Flywheel and engine frame

2) A negative degree of freedom for a linkage means
   a) Constrained motion of the linkage
   b) Any of the link
   c) Unconstrained motion of the linkage
   d) A statistically indeterminate structure

3) The Coriolis component of acceleration is taken into account for
   a) Slider-crank mech. b) 4 bar mechanism
   c) Quick-return motion mech. d) None of these

4) According to Kennedy's theorem, if three bodies move relatively to each other, their instantaneous centers will lie on a
   a) Straight line b) Parabolic curve
   c) Ellipse d) None of these

5) A Paucellier mechanism has
   a) 4 links b) 6 links c) 8 links d) 10 links

6) Davis steering gear fulfills the condition of correct gearing at
   a) Two positions b) Three positions
   c) All positions d) One position

7) The acceleration of the piston in a reciprocating steam engine is given by
   a) $\omega.r(\sin\theta + \sin 2\theta / n)$
   b) $\omega.r(\cos\theta + \cos 2\theta / n)$
   c) $\omega^2.r(\sin\theta + \sin 2\theta / n)$
   d) $\omega^2.r(\cos\theta + \cos 2\theta / n)$

8) The pressure angle of the cam _____ with increase in the base circle diameter.
   a) Decreases
   b) Increases
   c) Does not change
   d) May decrease or increase

9) A cam mechanism imparts
   a) Rotating motion
   b) Oscillating motion
   c) Reciprocating motion
   d) All of the above

10) The efficiency of a screw jack increases with
   a) Decrease in load
   b) Increase in load
   c) Decrease in pitch
   d) Increase in pitch

11) The frictional torque transmitted by a disc or plate clutch is same as that of
   a) Flat pivot bearing
   b) Flat collar bearing
   c) Conical pivot bearing
   d) Trapezoidal pivot bearing

12) In a governor if the equilibrium speed is constant for all radii of rotation of balls, the governor is said to be
   a) Stable b) Unstable c) Inertia d) Isochronous

13) The frictional resistance at the sleeve _____ the sensitivity of governor.
   a) Does not affect
   b) Increases
   c) Decreases
   d) May increase or decrease

14) The cam follower used in air-craft engine is _____ follower.
   a) Roller
   b) Flat faced
   c) Spherical faced
   d) Knife-edged

_____

SLR-VB – 85

Seat No.	

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
THEORY OF MACHINES – I

Day and Date : Thursday, 18-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
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SECTION – I

2. a) Explain inversions of double slider crank chain with neat sketches. **6**

b) The mechanism as shown in Fig. II (b). The lengths of various links are : AB = 150 mm ; BC = 300 mm ; CD = 225 mm ; and CE = 500 mm. When the crank AB rotates in the anticlockwise direction at a uniform speed of 240 r.p.m. ; By using Instantaneous Center Method find 1. Velocity of the slider E, and 2. Angular velocity of the links BC and CE. **8**

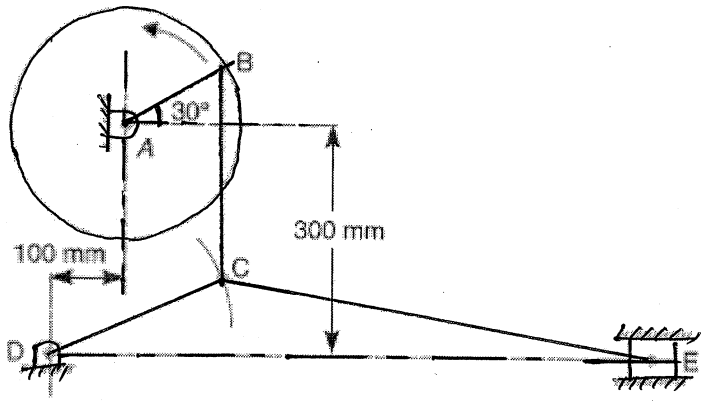


Fig. II(b)

3. a) Find out the acceleration of the slider D and the angular acceleration of link CD for the engine mechanism shown in Fig.III (a). The crank OA rotates uniformly at 180 r.p.m. in clockwise direction. The various lengths are : OA = 150 mm; AB = 450 mm PB = 240 mm; BC = 210 mm; CD = 660 mm. **10**

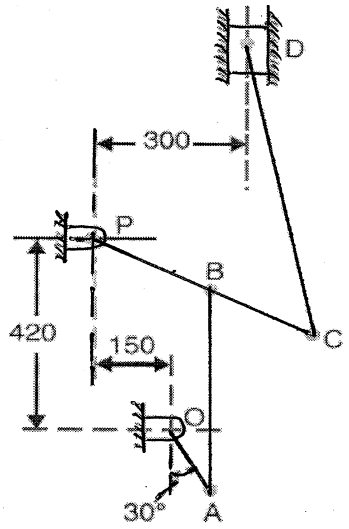


Fig. III (a)

b) Give the difference between Ackerman steering mechanism and Davis steering mechanism with neat sketch. **4**

4. a) The driving shaft of a Hooke's joint rotates at a uniform speed of 400 r.p.m. If the maximum variation in the speed is $\pm 6\%$ of the mean speed. Determine the greatest permissible angle between the axes of the shafts. What are the maximum and minimum speed of the driven shaft ? **6**

b) In a vertical double acting steam engine, the connecting rod is 4.6 times the crank. The weight of the reciprocating parts is 120 Kg and the stroke of the piston is 450 mm. The engine runs at 240 rpm. If the net load on the piston due to steam pressure is 28 KN when the crank has turned through an angle of 120° from I.D.C., determine the following : **8**

i) Thrust in the connecting rod
ii) Pressure on the slide bars
iii) Tangential force on the crank pin
iv) Thrust in the bearings.

SECTION – II

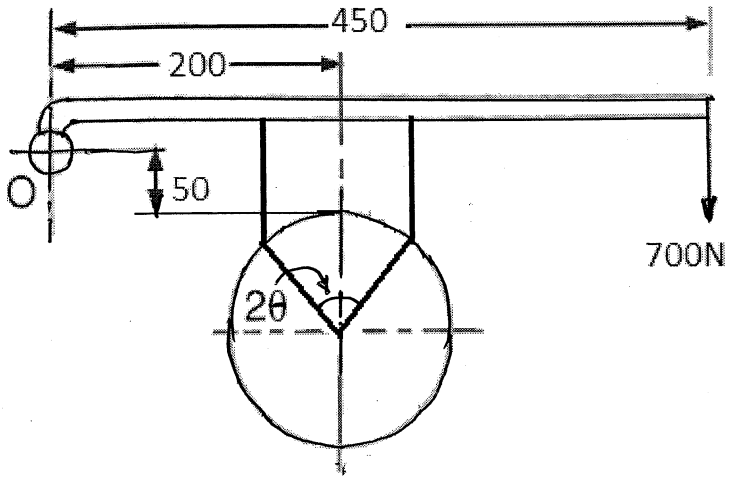
5. a) A cam rotating at a uniform speed of 1000 r.p.m. is required to give a roller follower the motion defined below :
   1) Follower to move outwards through 50 mm during 120° of cam rotation.
   2) Follower to dwell for next 60° of cam rotation.
   3) Follower to return to its starting position during next 90° of cam rotation.
   4) Follower to dwell for the rest of the cam rotation.

   The minimum radius of the cam is 50 mm and the diameter of roller is 10 mm. The line of stroke of the follower is off-set by 20 mm towards right from the axis of the cam shaft. If the displacement of the follower takes place with uniform and equal acceleration and retardation in outward stroke and by simple harmonic motion in return stroke, draw profile of the cam. **8**

   b) Derive an expression for torque required to raise the load in case of a screw jack. **6**

6. a) A conical pivot bearing with angle of cone as 100° supports a load of 18 KN. The external radius is 2.5 times the internal radius. The shaft rotates at 150 rpm. If the intensity of pressure is to be 300 KPa and coefficient of friction as 0.05, what is the power lost in working against friction ? **6**

   b) A single block brake is shown in Fig. VI (b). The diameter of the drum is 250 mm and the angle of contact is 90°. If the operating force of 700 N is applied at the end of a lever and the coefficient of friction between the drum and the lining is 0.35, determine the torque that may be transmitted by the block brake when the drum rotates in anticlockwise direction. **8**



All Dimensions are in mm

Fig. VI(b)

7. a) A centrifugal friction clutch has a driving member consisting of a spider carrying four shoes which are kept from contact with the clutch case by means of flat springs until increase of centrifugal force overcomes the resistance of the springs and the power is transmitted by friction between the shoes and the case.

   Determine the necessary mass of each shoe if 22.5 kW is to be transmitted at 750 r.p.m. with engagement beginning at 75% of the running speed. The inside diameter of the drum is 300 mm and the radial distance of the center of gravity of each shoe from the shaft axis is 125 mm. Assume $\mu = 0.25$. **6**

   b) The arms of a porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20 N of load at the sleeve, determine how the speed range is modified. **8**

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Seat No.	

Set **Q**

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
THEORY OF MACHINES – I

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SLR-VB – 85

Seat No.	

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
THEORY OF MACHINES – I

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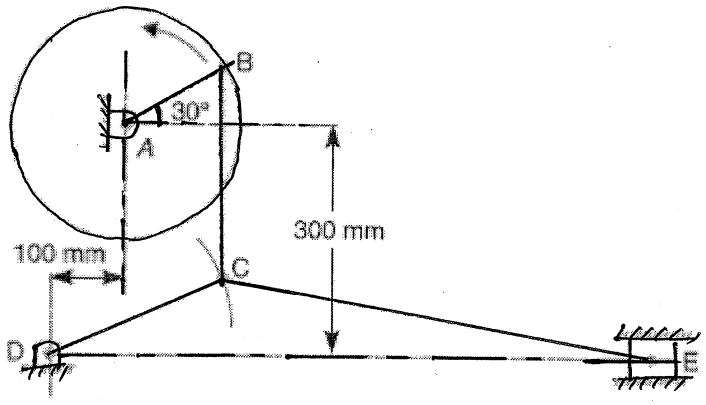

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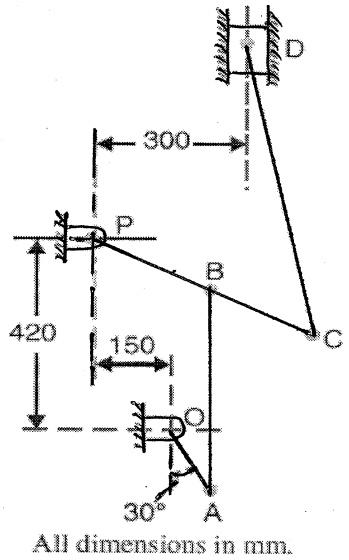

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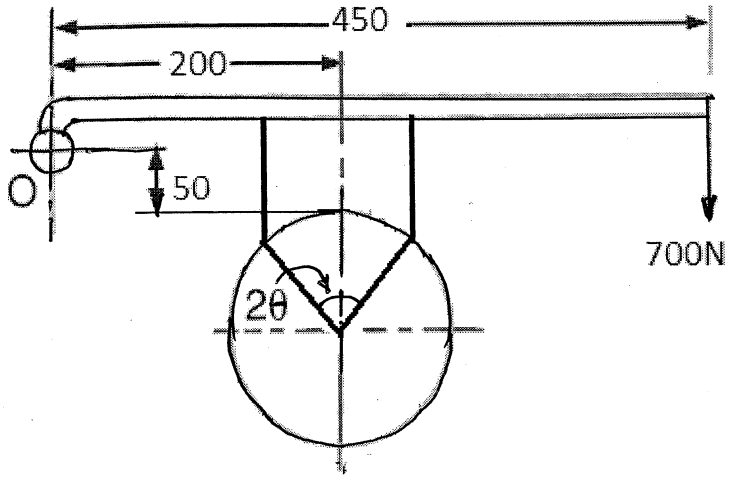

All Dimensions are in mm

Fig. VI(b)

Set Q

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   Determine the necessary mass of each shoe if 22.5 kW is to be transmitted at 750 r.p.m. with engagement beginning at 75% of the running speed. The inside diameter of the drum is 300 mm and the radial distance of the center of gravity of each shoe from the shaft axis is 125 mm. Assume $\mu = 0.25$. **6**

   b) The arms of a porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20 N of load at the sleeve, determine how the speed range is modified. **8**

SLR-VB – 85

Seat No.	

Set **R**

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
THEORY OF MACHINES – I

Day and Date : Thursday, 18-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only.***
Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) A Paucellier mechanism has
a) 4 links b) 6 links c) 8 links d) 10 links

2) Davis steering gear fulfills the condition of correct gearing at
a) Two positions b) Three positions
c) All positions d) One position

3) The acceleration of the piston in a reciprocating steam engine is given by
a) $\omega.r(\sin\theta + \sin 2\theta / n)$ b) $\omega.r(\cos\theta + \cos 2\theta / n)$
c) $\omega^2.r(\sin\theta + \sin 2\theta / n)$ d) $\omega^2.r(\cos\theta + \cos 2\theta / n)$

4) The pressure angle of the cam _____ with increase in the base circle diameter.
a) Decreases b) Increases
c) Does not change d) May decrease or increase

5) A cam mechanism imparts
a) Rotating motion b) Oscillating motion
c) Reciprocating motion d) All of the above

6) The efficiency of a screw jack increases with
a) Decrease in load b) Increase in load
c) Decrease in pitch d) Increase in pitch

7) The frictional torque transmitted by a disc or plate clutch is same as that of
a) Flat pivot bearing b) Flat collar bearing
c) Conical pivot bearing d) Trapezoidal pivot bearing

P.T.O.

8) In a governor if the equilibrium speed is constant for all radii of rotation of balls, the governor is said to be
   a) Stable b) Unstable c) Inertia d) Isochronous

9) The frictional resistance at the sleeve _____ the sensitivity of governor.
   a) Does not affect b) Increases
   c) Decreases d) May increase or decrease

10) The cam follower used in air-craft engine is _____ follower.
   a) Roller b) Flat faced
   c) Spherical faced d) Knife-edged

11) In a reciprocating steam engine, which of the following forms a kinematic link ?
   a) Cylinder and piston b) Piston rod and connecting rod
   c) Crank shaft and flywheel d) Flywheel and engine frame

12) A negative degree of freedom for a linkage means
   a) Constrained motion of the linkage
   b) Any of the link
   c) Unconstrained motion of the linkage
   d) A statistically indeterminate structure

13) The Coriolis component of acceleration is taken into account for
   a) Slider-crank mech. b) 4 bar mechanism
   c) Quick-return motion mech. d) None of these

14) According to Kennedy's theorem, if three bodies move relatively to each other, their instantaneous centers will lie on a
   a) Straight line b) Parabolic curve
   c) Ellipse d) None of these

_____

SLR-VB – 85

Seat No.	

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
THEORY OF MACHINES – I

Day and Date : Thursday, 18-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of calculator is* ***allowed****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Draw ***neat*** *sketches* ***wherever*** *necessary.*
5) Assume suitable data if necessary and state it ***clearly****.*

SECTION – I

2. a) Explain inversions of double slider crank chain with neat sketches. **6**

b) The mechanism as shown in Fig. II (b). The lengths of various links are : AB = 150 mm ; BC = 300 mm ; CD = 225 mm ; and CE = 500 mm. When the crank AB rotates in the anticlockwise direction at a uniform speed of 240 r.p.m. ; By using Instantaneous Center Method find 1. Velocity of the slider E, and 2. Angular velocity of the links BC and CE. **8**

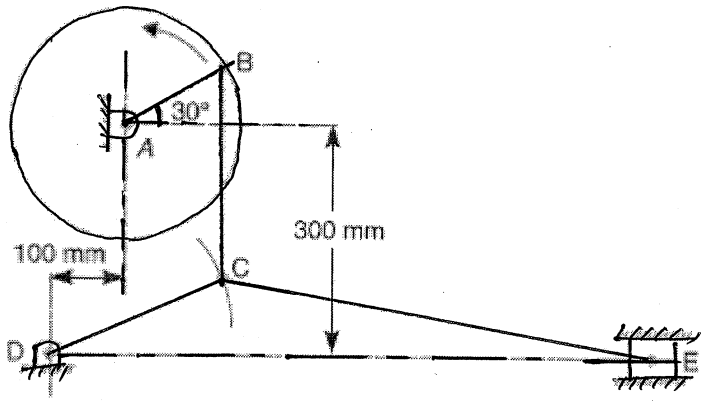


Fig. II(b)

3. a) Find out the acceleration of the slider D and the angular acceleration of link CD for the engine mechanism shown in Fig.III (a). The crank OA rotates uniformly at 180 r.p.m. in clockwise direction. The various lengths are : OA = 150 mm; AB = 450 mm PB = 240 mm; BC = 210 mm; CD = 660 mm. **10**

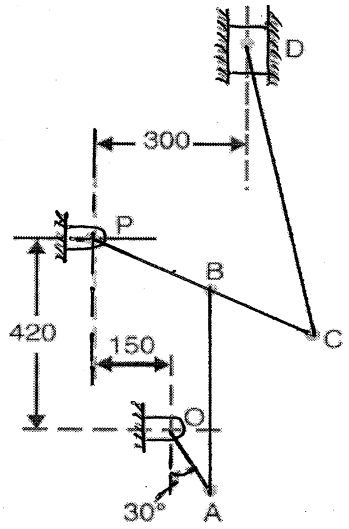


Fig. III (a)

b) Give the difference between Ackerman steering mechanism and Davis steering mechanism with neat sketch. **4**

4. a) The driving shaft of a Hooke's joint rotates at a uniform speed of 400 r.p.m. If the maximum variation in the speed is $\pm 6\%$ of the mean speed. Determine the greatest permissible angle between the axes of the shafts. What are the maximum and minimum speed of the driven shaft ? **6**

b) In a vertical double acting steam engine, the connecting rod is 4.6 times the crank. The weight of the reciprocating parts is 120 Kg and the stroke of the piston is 450 mm. The engine runs at 240 rpm. If the net load on the piston due to steam pressure is 28 KN when the crank has turned through an angle of 120° from I.D.C., determine the following : **8**

i) Thrust in the connecting rod
ii) Pressure on the slide bars
iii) Tangential force on the crank pin
iv) Thrust in the bearings.

SECTION – II

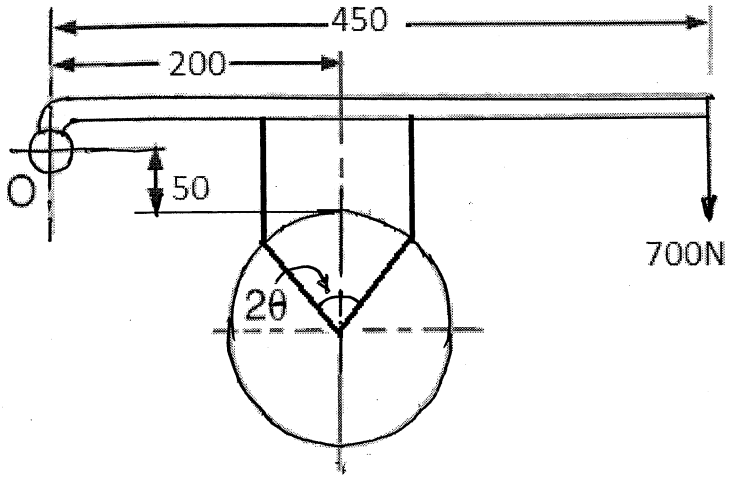
5. a) A cam rotating at a uniform speed of 1000 r.p.m. is required to give a roller follower the motion defined below :
   1) Follower to move outwards through 50 mm during 120° of cam rotation.
   2) Follower to dwell for next 60° of cam rotation.
   3) Follower to return to its starting position during next 90° of cam rotation.
   4) Follower to dwell for the rest of the cam rotation.

   The minimum radius of the cam is 50 mm and the diameter of roller is 10 mm. The line of stroke of the follower is off-set by 20 mm towards right from the axis of the cam shaft. If the displacement of the follower takes place with uniform and equal acceleration and retardation in outward stroke and by simple harmonic motion in return stroke, draw profile of the cam. **8**

   b) Derive an expression for torque required to raise the load in case of a screw jack. **6**

6. a) A conical pivot bearing with angle of cone as 100° supports a load of 18 KN. The external radius is 2.5 times the internal radius. The shaft rotates at 150 rpm. If the intensity of pressure is to be 300 KPa and coefficient of friction as 0.05, what is the power lost in working against friction ? **6**

   b) A single block brake is shown in Fig. VI (b). The diameter of the drum is 250 mm and the angle of contact is 90°. If the operating force of 700 N is applied at the end of a lever and the coefficient of friction between the drum and the lining is 0.35, determine the torque that may be transmitted by the block brake when the drum rotates in anticlockwise direction. **8**



All Dimensions are in mm

Fig. VI(b)

Set R

7. a) A centrifugal friction clutch has a driving member consisting of a spider carrying four shoes which are kept from contact with the clutch case by means of flat springs until increase of centrifugal force overcomes the resistance of the springs and the power is transmitted by friction between the shoes and the case.

   Determine the necessary mass of each shoe if 22.5 kW is to be transmitted at 750 r.p.m. with engagement beginning at 75% of the running speed. The inside diameter of the drum is 300 mm and the radial distance of the center of gravity of each shoe from the shaft axis is 125 mm. Assume $\mu = 0.25$. **6**

   b) The arms of a porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20 N of load at the sleeve, determine how the speed range is modified. **8**

SLR-VB – 85

Seat No.	

Set S

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
THEORY OF MACHINES – I

Day and Date : Thursday, 18-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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   a) Decrease in load b) Increase in load
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_____

SLR-VB – 85

Seat No.	

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
THEORY OF MACHINES – I

Day and Date : Thursday, 18-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

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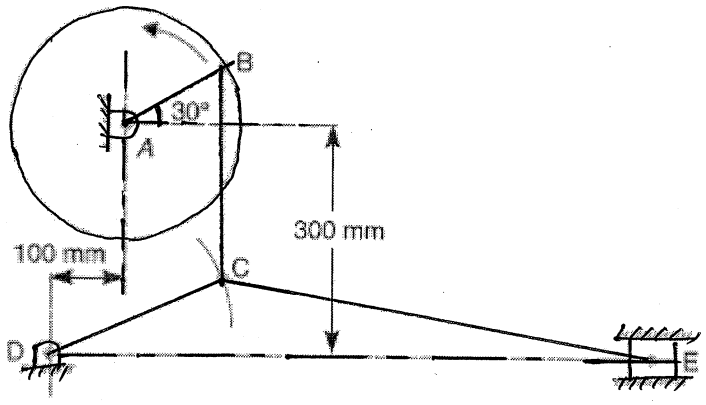

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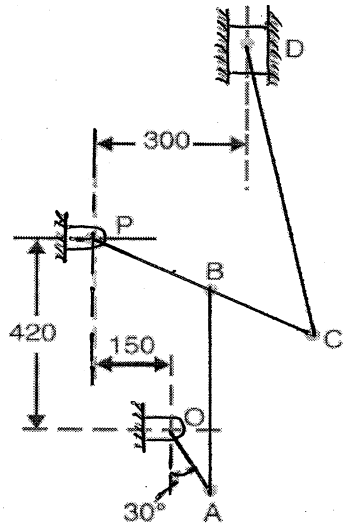

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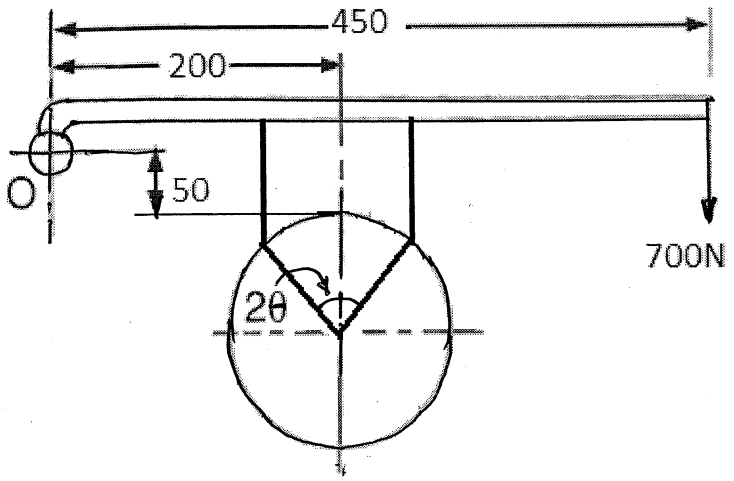

All Dimensions are in mm

Fig. VI(b)

7. a) A centrifugal friction clutch has a driving member consisting of a spider carrying four shoes which are kept from contact with the clutch case by means of flat springs until increase of centrifugal force overcomes the resistance of the springs and the power is transmitted by friction between the shoes and the case.

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SLR-VB – 86

Seat No.	

Set P

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
MANUFACTURING PROCESSES

Day and Date : Saturday, 20-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Choose the correct answer (**1** mark **each**) : **(1×8=8)**

1) Which of the following material is not used for charging in cupola ?
   a) MS scrap b) Pig iron
   c) Returns d) CI borings (chips)

2) The furnace commonly used in non ferrous foundries is
   a) Direct arc furnaces b) Cupola
   c) Induction furnace d) None of the above

3) Higher ramming density gives _____ to mould.
   a) Good collapsibility b) Low permeability
   c) Low strength d) High permeability

4) Following is the product of Thermosetting Plastics
   a) Oil bottle b) Plastic dishes
   c) Bucket d) Electrical components

5) _____ is one of filler metal used in the soldering.
   a) Fe b) Ar c) Ag d) Au

6) Which of the following additives in sand is reducing agent ?
   a) Saw dust b) Coal dust c) Iron oxide d) Bentonite

P.T.O.

7) Mild Steel bar used for workshop practical is manufactured by

a) Rolling b) Casting c) Forging d) Extrusion

8) The billet is uniformly confined from all sides in case of _____ extrusion.

a) Direct b) Indirect c) Hydrostatic d) Impact

B) Choose the correct answer (**2** marks **each**) : **(2×3=6)**

1) For joining of two parts without use of extra filler metal, following processes are used

a) Brazing b) TIG welding

c) MIG welding d) Resistance welding

2) Investment Casting process

a) use Metal Pattern

b) is suitable for Mass Production

c) uses wax pattern

d) is used for manufacturing of Lathe Bed

3) Cam shaft for automotive is manufactured by

a) Casting b) Forging c) Extrusion d) Rolling

_____

SLR-VB – 86

Seat No.	

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
MANUFACTURING PROCESSES

Day and Date : Saturday, 20-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
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3) Assume additional suitable data ***wherever*** *necessary and mention it clearly.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. a) Explain the following with neat sketch : **6**
   i) Follow board pattern.
   ii) Horizontal core.
   b) Explain the various allowances provided on pattern. **5**
   c) What are the advantages of casting process ? **3**

3. a) Enlist requisite properties of green molding sand. **4**
   b) Explain the advantages and limitations of Investment casting process. **4**
   c) Explain various elements of gating system with neat sketch. What is gating ratio ? **6**

4. a) Explain with neat sketch construction and steps in operation of cupola. **6**
   b) Explain the process of blow molding of plastics with neat sketch. **5**
   c) Explain the advantages of mechanization in a foundry. **3**

SECTION – II

5. a) Compare between Hot working and cold working processes. **4**
   b) Explain with neat sketch the process of closed die forging. **5**
   c) Explain classification of Rolling mills on the basis of no. of stands in rolling mill. **5**

6. a) Explain with neat sketch, process of direct extrusion, with its advantages and limitations. **5**

   b) Explain the process of rod drawing with neat sketch. **4**

   c) Enlist the processes of tube drawing and explain the process of tube drawing with floating mandrel. **5**

7. a) Explain various types of flames in gas welding with neat sketch. **6**

   b) Compare between TIG welding and MIG welding. **4**

   c) Compare between welding brazing. **4**

SLR-VB – 86

Seat No.	

Set Q

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
MANUFACTURING PROCESSES

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Choose the correct answer (**1** mark **each**) : **(1×8=8)**

1) Following is the product of Thermosetting Plastics
   a) Oil bottle b) Plastic dishes
   c) Bucket d) Electrical components

2) _____ is one of filler metal used in the soldering.
   a) Fe b) Ar c) Ag d) Au

3) Which of the following additives in sand is reducing agent ?
   a) Saw dust b) Coal dust c) Iron oxide d) Bentonite

4) Mild Steel bar used for workshop practical is manufactured by
   a) Rolling b) Casting c) Forging d) Extrusion

5) The billet is uniformly confined from all sides in case of _____ extrusion.
   a) Direct b) Indirect c) Hydrostatic d) Impact

6) Which of the following material is not used for charging in cupola ?
   a) MS scrap b) Pig iron
   c) Returns d) CI borings (chips)

7) The furnace commonly used in non ferrous foundries is

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8) Higher ramming density gives _____ to mould.

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B) Choose the correct answer (**2** marks **each**) : **(2×3=6)**

1) Cam shaft for automotive is manufactured by

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SLR-VB – 86

Seat No.	

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Set Q

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SLR-VB – 86

Seat No.	

Set R

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7) Following is the product of Thermosetting Plastics

a) Oil bottle b) Plastic dishes

c) Bucket d) Electrical components

8) _____ is one of filler metal used in the soldering.

a) Fe b) Ar c) Ag d) Au

B) Choose the correct answer (**2** marks **each**) : **(2×3=6)**

1) Investment Casting process

a) use Metal Pattern

b) is suitable for Mass Production

c) uses wax pattern

d) is used for manufacturing of Lathe Bed

2) For joining of two parts without use of extra filler metal, following processes are used

a) Brazing b) TIG welding

c) MIG welding d) Resistance welding

3) Cam shaft for automotive is manufactured by

a) Casting b) Forging c) Extrusion d) Rolling

_____

SLR-VB – 86

Seat No.	

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
MANUFACTURING PROCESSES

Day and Date : Saturday, 20-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any two** questions from **each** Section.*
*2) **Neat** sketches must be drawn **wherever** necessary.*
*3) Assume additional suitable data **wherever** necessary and mention it clearly.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Explain the following with neat sketch : **6**
   i) Follow board pattern.
   ii) Horizontal core.
   b) Explain the various allowances provided on pattern. **5**
   c) What are the advantages of casting process ? **3**

3. a) Enlist requisite properties of green molding sand. **4**
   b) Explain the advantages and limitations of Investment casting process. **4**
   c) Explain various elements of gating system with neat sketch. What is gating ratio ? **6**

4. a) Explain with neat sketch construction and steps in operation of cupola. **6**
   b) Explain the process of blow molding of plastics with neat sketch. **5**
   c) Explain the advantages of mechanization in a foundry. **3**

SECTION – II

5. a) Compare between Hot working and cold working processes. **4**
   b) Explain with neat sketch the process of closed die forging. **5**
   c) Explain classification of Rolling mills on the basis of no. of stands in rolling mill. **5**

Set R

6. a) Explain with neat sketch, process of direct extrusion, with its advantages and limitations. **5**

   b) Explain the process of rod drawing with neat sketch. **4**

   c) Enlist the processes of tube drawing and explain the process of tube drawing with floating mandrel. **5**

7. a) Explain various types of flames in gas welding with neat sketch. **6**

   b) Compare between TIG welding and MIG welding. **4**

   c) Compare between welding brazing. **4**

SLR-VB – 86

Seat No.	

Set S

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
MANUFACTURING PROCESSES

Day and Date : Saturday, 20-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Choose the correct answer (**1** mark **each**) : **(1×8=8)**

1) Mild Steel bar used for workshop practical is manufactured by
a) Rolling b) Casting c) Forging d) Extrusion

2) The billet is uniformly confined from all sides in case of _____ extrusion.
a) Direct b) Indirect c) Hydrostatic d) Impact

3) Which of the following material is not used for charging in cupola ?
a) MS scrap b) Pig iron
c) Returns d) CI borings (chips)

4) The furnace commonly used in non ferrous foundries is
a) Direct arc furnaces b) Cupola
c) Induction furnace d) None of the above

5) Higher ramming density gives _____ to mould.
a) Good collapsibility b) Low permeability
c) Low strength d) High permeability

6) Following is the product of Thermosetting Plastics
a) Oil bottle b) Plastic dishes
c) Bucket d) Electrical components

P.T.O.

7) _____ is one of filler metal used in the soldering.

a) Fe b) Ar c) Ag d) Au

8) Which of the following additives in sand is reducing agent ?

a) Saw dust b) Coal dust c) Iron oxide d) Bentonite

B) Choose the correct answer (**2** marks **each**) : **(2×3=6)**

1) Cam shaft for automotive is manufactured by

a) Casting b) Forging c) Extrusion d) Rolling

2) For joining of two parts without use of extra filler metal, following processes are used

a) Brazing b) TIG welding

c) MIG welding d) Resistance welding

3) Investment Casting process

a) use Metal Pattern

b) is suitable for Mass Production

c) uses wax pattern

d) is used for manufacturing of Lathe Bed

_____

SLR-VB – 86

Seat No.	

S.E. (Mechanical Engineering) (Part – II) (CGPA) Examination, 2017
MANUFACTURING PROCESSES

Day and Date : Saturday, 20-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

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*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Explain the following with neat sketch : **6**
   i) Follow board pattern.
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   c) What are the advantages of casting process ? **3**

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SECTION – II

5. a) Compare between Hot working and cold working processes. **4**
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Set S

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   b) Explain the process of rod drawing with neat sketch. **4**

   c) Enlist the processes of tube drawing and explain the process of tube drawing with floating mandrel. **5**

7. a) Explain various types of flames in gas welding with neat sketch. **6**

   b) Compare between TIG welding and MIG welding. **4**

   c) Compare between welding brazing. **4**

SLR-VB – 87

Seat No.	

Set **P**

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
NUMERICAL METHODS

Day and Date : Tuesday, 23-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of calculator is **allowed**.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) Which of the following method is slow method for finding the root of algebraic and transcendental equation f(x) = 0 ?
   a) Newton-Raphson method b) False position method
   c) Bisection method d) Muller's method

2) If $y = x^2$, then the first divided difference of the arguments 1 and 2 is
   a) 2 b) 3 c) 0 d) 1

3) Using Newton-Raphson method the first approximation to the root of the equation $x^4 - x - 10 = 0$ near to $x_0 = 2$ is
   a) 1.671 b) 2.271
   c) 2.071 d) 1.871

4) The equations of lines of regression are $10y = x + 17$ and $x = 5y - 7$, then the mean of x and mean of y are
   a) 3 and 1 b) 3 and 2 c) 2 and 1 d) 3 and 4

5) Identify the method of solving simultaneous linear equations in which the coefficient matrix is expressed as the product of a lower and upper triangular matrics.
   a) Gauss-Jacobis method b) Gauss-Jordon method
   c) Gauss Elimination method d) Factorization method

6) To fit a polynomial $a_0 + a_1x + a_2x^2 + a_3x^3$ to the given data of n observation by least square principle, the required number of normal equations are
   a) 3 b) 2 c) 4 d) n

7) Which of the following method is used to find numerically largest Eigen value of matrix ?
   a) Newton-Raphson method b) Power method
   c) Muller method d) Lagrange's method

P.T.O.

8) For the data

x :	2	4	6	8
f(x):	3	5	6	7

$\int_2^8 f(x)\,dx$ when found by the trapezoidal rule is

a) 18 b) 25 c) 16 d) 32

9) The number of strips required in Weddle's rule is

a) A multiple of 2 b) A multiple of 3 c) A multiple of 6 d) None of these

10) The finite difference scheme for the equation $2y'' + y = 5$ is

a) $y_{i+1} - 2y_i + y_{i-1} + h^2 y_i = 5h^2$ b) $y_{i+1} + 2y_i + y_{i-1} + hy_i = 5h^2$

c) $y_{i+1} - 2y_i + y_{i-1} + h^2 y_i = 5h$ d) None of these

11) In solving a set of simultaneous ordinary differential equations

$\frac{dy}{dx} = f(x, y, z), \frac{dz}{dx} = \phi(x, y, z)$ by Runge – Kutta fourth order method, which of the following is correct ?

a) $k_1 = \frac{h}{2} f(x_0, y_0, z_0), l_1 = \frac{h}{2}\phi(x_0, y_0, z_0)$

b) $k_2 = hf\left(x_0 + \frac{h}{2}, y_0 + \frac{k_1}{2}, z_0 + \frac{l_1}{2}\right), l_2 = h\phi\left(x_0 + \frac{h}{2}, y_0 + \frac{k_1}{2}, z_0 + \frac{l_1}{2}\right)$

c) $k_2 = hf(x_0 + h, y_0 + k_1, z_0 + l_1), l_2 = h\phi(x_0 + h, y_0 + k_1, z_0 + l_1)$

d) None of these

12) The partial differential equation $2x^2 f_{xx} + (1 - y^2) f_{yy} = 0$ is parabolic when

a) $x = 1$ b) $x = 0$ or $y = \pm 1$ c) $|y| > 1$ d) $y = 0$

13) Wave equation is represented by

a) $u_{tt} - c^2\nabla^2 u = 0$ b) $u_t - k\nabla^2 u = 0$ c) $\nabla^2 u = f(x, y, z)$ d) $\nabla^2 u = 0$

14) Consider one dimension heat equation $U_{xx} - aU_t = 0$, h and k are spacings for values of x and y, $\lambda = \frac{k}{dh^2}$. The Crank-Nicholson difference method for solving the above equation is convergent when

a) $h \geq 1$ b) $0 < \lambda \leq \frac{1}{2}$

c) $0 \leq \lambda \leq 1$ d) For all finite values of λ

SLR-VB – 87

Seat No.	

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
NUMERICAL METHODS

Day and Date : Tuesday, 23-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*

*2) Figures to the **right** indicate **full** marks.*

*3) **Use** of calculator is **allowed**.*

SECTION – I

2. Solve the following :

a) Find the positive real root of the equation $x^2 - \log_{10}x - 12 = 0$ correct to three places of decimals using Regula Falsi method. **3**

b) Perform two iterations of Newton-Raphson method to solve the system of non-linear equations $x^2 + y^2 = 4$ and $y + e^x = 1$ starting with $x_0 = 1$, $y_0 = -1.7$ as initial approximations. **4**

c) Find double root near to 1.5 of the equation $x^3 - 5.4x^2 + 9.24x - 5.096 = 0$ by Newton-Raphson method. **3**

3. a) Solve the following set of equations of by Gauss-Seidal method correct to three decimal places. $10x + y + z = 12$; $2x + 10y + z = 13$; $2x + 2y + 10z = 14$. **4**

b) Attempt **any one** from the following : **5**

i) Apply Gauss-Jordan method to solve the equations $x + y + z = 9$, $2x - 3y + 4z = 13$, $3x + 4y + 5z = 40$.

ii) Find the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ using Power method. Take $[1\ 0\ 0]^T$ as initial eigen vector (perform six iterations).

4. Solve the following :

a) Find cubical function f(x) from the following table using Newton's divided difference formula

x	:	0	1	2	5
$f(x)$	:	2	3	12	147

3

b) Fit a second degree parabola $y = a + bx + cx^2$ to the following data by least square principle.

x	:	0	1	2	3	4
y	:	1	0	3	10	21

3

c) The line of regression of y on x is $6y = 5x + 90$ and the line of regression of x on y is $15x = 8y + 130$. Find the mean of x and y and the coefficient of correlation. **3**

5. a) Use Lagrange's interpolation formula to find f (6) from the following data :

x	:	3	7	9	10
$f(x)$	:	168	120	72	63

4

b) Find a positive real root of the equation $x^3 - x - 11 = 0$ correct to three places of decimal using Bisection method. **5**

SECTION – II

6. Attempt **any three** from the following : **(3×3=9)**

a) Compute the value of $\int_{0.2}^{1.4} \left(\sin x - \log x + e^x\right) dx$ using Simpson's three-eighth rule, taking seven ordinates.

b) Apply trapezoidal rule to evaluate $\int_1^5 \int_1^5 \frac{dxdy}{\sqrt{x^2 + y^2}}$, taking two-sub-intervals.

c) Using three point Gaussian quadrature formula evaluate $\int_1^2 \frac{1}{1+x^3} dx$.

d) Use Simpson's one-third rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates.

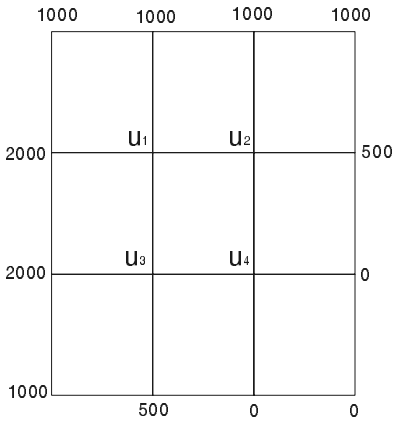
7. a) Apply Picard's method to find the second approximations to the values of y and z, given that $\frac{dy}{dx} = z, \frac{dz}{dx} = x^3(y+z)$, given $y = 1, z = \frac{1}{2}$ at $x = 0$. **4**

   b) Using the finite difference method find y(0.25), y(0.5) and y(0.75) satisfying the differential equation $\frac{d^2y}{dx^2} + y = x$, subject to the boundary conditions y(0) = 0, y(1) = 2. **5**

8. a) Solve the boundary value problem $u_t = u_{xx}$ under the conditions u(0, t) = u(1, t) = 0 and $u(x, 0) = \sin \pi x, 0 \le x \le 1$ using Schmidt method. (Take h = 0.2 and $\alpha = \frac{1}{2}$). **4**

   b) Given $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, u(0, t) = 0, u(4, t) = 0$ and $u(x, 0) = \frac{x}{3}(16 - x^2)$. Obtain u_{ij} for i = 1, 2, 3, 4 and j = 1, 2 using Crank-Nicholson method. (Take h = 1). **5**

9. a) Evaluate the function u(x, y) satisfying $\nabla^2 u = 0$ at the pivotal points given the boundary values as follows (Take five iterations). **6**



   b) Use Rombergs method to compute $\int_0^1 \frac{dx}{1+x^2}$ correct to four decimal places (Take h = 0.5 and 0.25). **4**

Set P

Set P

SLR-VB – 87

Seat No.	

Set Q

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
NUMERICAL METHODS

Day and Date : Tuesday, 23-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) For the data

x :	2	4	6	8
f(x):	3	5	6	7

$\int_2^8 f(x)\,dx$ when found by the trapezoidal rule is

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P.T.O.

5) The partial differential equation $2x^2 f_{xx} + (1 - y^2)f_{yy} = 0$ is parabolic when

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14) Which of the following method is used to find numerically largest Eigen value of matrix ?

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Seat No.	

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
NUMERICAL METHODS

Day and Date : Tuesday, 23-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

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SECTION – I

2. Solve the following :

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SECTION – II

6. Attempt **any three** from the following : **(3×3=9)**

a) Compute the value of $\int_{0.2}^{1.4} \left(\sin x - \log x + e^x\right) dx$ using Simpson's three-eighth rule, taking seven ordinates.

b) Apply trapezoidal rule to evaluate $\int_1^5 \int_1^5 \frac{dxdy}{\sqrt{x^2 + y^2}}$, taking two-sub-intervals.

c) Using three point Gaussian quadrature formula evaluate $\int_1^2 \frac{1}{1+x^3} dx$.

d) Use Simpson's one-third rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates.

Set Q

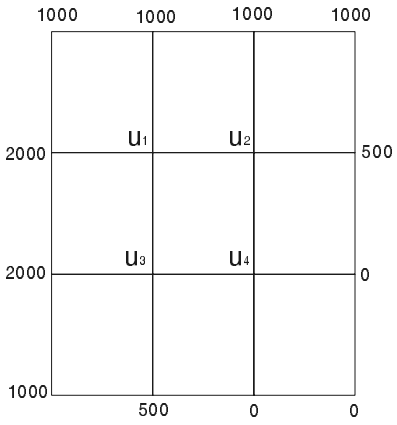
7. a) Apply Picard's method to find the second approximations to the values of y and z, given that $\frac{dy}{dx} = z, \frac{dz}{dx} = x^3(y+z)$, given $y = 1, z = \frac{1}{2}$ at $x = 0$. **4**

   b) Using the finite difference method find y(0.25), y(0.5) and y(0.75) satisfying the differential equation $\frac{d^2y}{dx^2} + y = x$, subject to the boundary conditions y(0) = 0, y(1) = 2. **5**

8. a) Solve the boundary value problem $u_t = u_{xx}$ under the conditions u(0, t) = u(1, t) = 0 and $u(x, 0) = \sin \pi x, 0 \le x \le 1$ using Schmidt method. (Take h = 0.2 and $\alpha = \frac{1}{2}$). **4**

   b) Given $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$, $u(0, t) = 0, u(4, t) = 0$ and $u(x, 0) = \frac{x}{3}(16 - x^2)$. Obtain u_{ij} for i = 1, 2, 3, 4 and j = 1, 2 using Crank-Nicholson method. (Take h = 1). **5**

9. a) Evaluate the function u(x, y) satisfying $\nabla^2 u = 0$ at the pivotal points given the boundary values as follows (Take five iterations). **6**



   b) Use Rombergs method to compute $\int_0^1 \frac{dx}{1+x^2}$ correct to four decimal places (Take h = 0.5 and 0.25). **4**

Set Q

Set Q

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Seat No.	

Set **R**

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
NUMERICAL METHODS

Day and Date : Tuesday, 23-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
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*3) **Use** of calculator is **allowed**.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) Identify the method of solving simultaneous linear equations in which the coefficient matrix is expressed as the product of a lower and upper triangular matrics.
   a) Gauss-Jacobis method b) Gauss-Jordon method
   c) Gauss Elimination method d) Factorization method

2) To fit a polynomial $a_0 + a_1x + a_2x^2 + a_3x^3$ to the given data of n observation by least square principle, the required number of normal equations are
   a) 3 b) 2 c) 4 d) n

3) Which of the following method is used to find numerically largest Eigen value of matrix ?
   a) Newton-Raphson method b) Power method
   c) Muller method d) Lagrange's method

4) For the data

x :	2	4	6	8
f(x):	3	5	6	7

$\int_2^8 f(x)\,dx$ when found by the trapezoidal rule is
   a) 18 b) 25 c) 16 d) 32

5) The number of strips required in Weddle's rule is
   a) A multiple of 2 b) A multiple of 3 c) A multiple of 6 d) None of these

6) The finite difference scheme for the equation $2y'' + y = 5$ is
   a) $y_{i+1} - 2y_i + y_{i-1} + h^2y_i = 5h^2$ b) $y_{i+1} + 2y_i + y_{i-1} + hy_i = 5h^2$
   c) $y_{i+1} - 2y_i + y_{i-1} + h^2y_i = 5h$ d) None of these

P.T.O.

7) In solving a set of simultaneous ordinary differential equations $\frac{dy}{dx} = f(x, y, z), \frac{dz}{dx} = \phi(x, y, z)$ by Runge – Kutta fourth order method, which of the following is correct ?

a) $k_1 = \frac{h}{2} f(x_0, y_0, z_0), l_1 = \frac{h}{2}\phi(x_0, y_0, z_0)$

b) $k_2 = hf\left(x_0 + \frac{h}{2}, y_0 + \frac{k_1}{2}, z_0 + \frac{l_1}{2}\right), l_2 = h\phi\left(x_0 + \frac{h}{2}, y_0 + \frac{k_1}{2}, z_0 + \frac{l_1}{2}\right)$

c) $k_2 = hf(x_0 + h, y_0 + k_1, z_0 + l_1), l_2 = h\phi(x_0 + h, y_0 + k_1, z_0 + l_1)$

d) None of these

8) The partial differential equation $2x^2 f_{xx} + (1 - y^2)f_{yy} = 0$ is parabolic when

a) $x = 1$ b) $x = 0$ or $y = \pm 1$ c) $|y| > 1$ d) $y = 0$

9) Wave equation is represented by

a) $u_{tt} - c^2\nabla^2 u = 0$ b) $u_t - k\nabla^2 u = 0$ c) $\nabla^2 u = f(x, y, z)$ d) $\nabla^2 u = 0$

10) Consider one dimension heat equation $U_{xx} - aU_t = 0$, h and k are spacings for values of x and y, $\lambda = \frac{k}{dh^2}$. The Crank-Nicholson difference method for solving the above equation is convergent when

a) $h \geq 1$ b) $0 < \lambda \leq \frac{1}{2}$

c) $0 \leq \lambda \leq 1$ d) For all finite values of λ

11) Which of the following method is slow method for finding the root of algebraic and transcendental equation f(x) = 0 ?

a) Newton-Raphson method b) False position method

c) Bisection method d) Muller's method

12) If $y = x^2$, then the first divided difference of the arguments 1 and 2 is

a) 2 b) 3 c) 0 d) 1

13) Using Newton-Raphson method the first approximation to the root of the equation $x^4 - x - 10 = 0$ near to $x_0 = 2$ is

a) 1.671 b) 2.271

c) 2.071 d) 1.871

14) The equations of lines of regression are $10y = x + 17$ and $x = 5y - 7$, then the mean of x and mean of y are

a) 3 and 1 b) 3 and 2 c) 2 and 1 d) 3 and 4

Seat No.	

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
NUMERICAL METHODS

Day and Date : Tuesday, 23-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*

*2) Figures to the **right** indicate **full** marks.*

*3) **Use** of calculator is **allowed**.*

SECTION – I

2. Solve the following :

a) Find the positive real root of the equation $x^2 - \log_{10}x - 12 = 0$ correct to three places of decimals using Regula Falsi method. **3**

b) Perform two iterations of Newton-Raphson method to solve the system of non-linear equations $x^2 + y^2 = 4$ and $y + e^x = 1$ starting with $x_0 = 1$, $y_0 = -1.7$ as initial approximations. **4**

c) Find double root near to 1.5 of the equation $x^3 - 5.4x^2 + 9.24x - 5.096 = 0$ by Newton-Raphson method. **3**

3. a) Solve the following set of equations of by Gauss-Seidal method correct to three decimal places. $10x + y + z = 12$; $2x + 10y + z = 13$; $2x + 2y + 10z = 14$. **4**

b) Attempt **any one** from the following : **5**

i) Apply Gauss-Jordan method to solve the equations $x + y + z = 9$, $2x - 3y + 4z = 13$, $3x + 4y + 5z = 40$.

ii) Find the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ using Power method. Take $[1\ 0\ 0]^T$ as initial eigen vector (perform six iterations).

4. Solve the following :

a) Find cubical function f(x) from the following table using Newton's divided difference formula

x	0	1	2	5
$f(x)$	2	3	12	147

3

b) Fit a second degree parabola $y = a + bx + cx^2$ to the following data by least square principle.

x	0	1	2	3	4
y	1	0	3	10	21

3

c) The line of regression of y on x is $6y = 5x + 90$ and the line of regression of x on y is $15x = 8y + 130$. Find the mean of x and y and the coefficient of correlation. **3**

5. a) Use Lagrange's interpolation formula to find f (6) from the following data :

x	3	7	9	10
$f(x)$	168	120	72	63

4

b) Find a positive real root of the equation $x^3 - x - 11 = 0$ correct to three places of decimal using Bisection method. **5**

SECTION – II

6. Attempt **any three** from the following : **(3×3=9)**

a) Compute the value of $\int_{0.2}^{1.4} \left(\sin x - \log x + e^x\right) dx$ using Simpson's three-eighth rule, taking seven ordinates.

b) Apply trapezoidal rule to evaluate $\int_1^5 \int_1^5 \frac{dxdy}{\sqrt{x^2 + y^2}}$, taking two-sub-intervals.

c) Using three point Gaussian quadrature formula evaluate $\int_1^2 \frac{1}{1+x^3} dx$.

d) Use Simpson's one-third rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates.

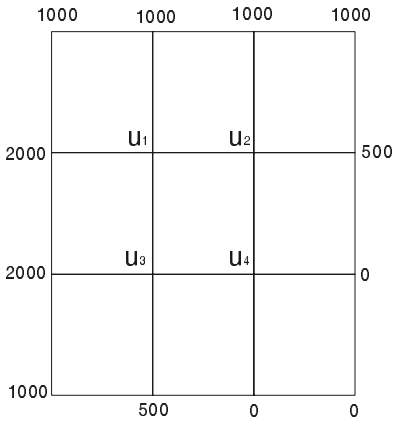
7. a) Apply Picard's method to find the second approximations to the values of y and z, given that $\frac{dy}{dx} = z, \frac{dz}{dx} = x^3(y+z)$, given $y = 1, z = \frac{1}{2}$ at $x = 0$. **4**

   b) Using the finite difference method find y(0.25), y(0.5) and y(0.75) satisfying the differential equation $\frac{d^2y}{dx^2} + y = x$, subject to the boundary conditions y(0) = 0, y(1) = 2. **5**

8. a) Solve the boundary value problem $u_t = u_{xx}$ under the conditions u(0, t) = u(1, t) = 0 and $u(x, 0) = \sin \pi x, 0 \le x \le 1$ using Schmidt method. (Take h = 0.2 and $\alpha = \frac{1}{2}$). **4**

   b) Given $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$, $u(0, t) = 0, u(4, t) = 0$ and $u(x, 0) = \frac{x}{3}(16 - x^2)$. Obtain u_{ij} for i = 1, 2, 3, 4 and j = 1, 2 using Crank-Nicholson method. (Take h = 1). **5**

9. a) Evaluate the function u(x, y) satisfying $\nabla^2 u = 0$ at the pivotal points given the boundary values as follows (Take five iterations). **6**



   b) Use Rombergs method to compute $\int_0^1 \frac{dx}{1+x^2}$ correct to four decimal places (Take h = 0.5 and 0.25). **4**

Set R

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Seat No.	

Set **S**

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
NUMERICAL METHODS

Day and Date : Tuesday, 23-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of calculator is **allowed**.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) The finite difference scheme for the equation $2y'' + y = 5$ is

a) $y_{i+1} - 2y_i + y_{i-1} + h^2 y_i = 5h^2$ b) $y_{i+1} + 2y_i + y_{i-1} + hy_i = 5h^2$
c) $y_{i+1} - 2y_i + y_{i-1} + h^2 y_i = 5h$ d) None of these

2) In solving a set of simultaneous ordinary differential equations

$\frac{dy}{dx} = f(x, y, z), \frac{dz}{dx} = \phi(x, y, z)$ by Runge – Kutta fourth order method, which of the following is correct ?

a) $k_1 = \frac{h}{2} f(x_0, y_0, z_0), l_1 = \frac{h}{2}\phi(x_0, y_0, z_0)$

b) $k_2 = hf\left(x_0 + \frac{h}{2}, y_0 + \frac{k_1}{2}, z_0 + \frac{l_1}{2}\right), l_2 = h\phi\left(x_0 + \frac{h}{2}, y_0 + \frac{k_1}{2}, z_0 + \frac{l_1}{2}\right)$

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d) None of these

3) The partial differential equation $2x^2 f_{xx} + (1 - y^2) f_{yy} = 0$ is parabolic when

a) $x = 1$ b) $x = 0$ or $y = \pm 1$
c) $|y| > 1$ d) $y = 0$

4) Wave equation is represented by

a) $u_{tt} - c^2 \nabla^2 u = 0$ b) $u_t - k\nabla^2 u = 0$

c) $\nabla^2 u = f(x, y, z)$ d) $\nabla^2 u = 0$

P.T.O.

5) Consider one dimension heat equation $U_{xx} - aU_t = 0$, h and k are spacings for values of x and y, $\lambda = \frac{k}{dh^2}$. The Crank-Nicholson difference method for solving the above equation is convergent when

a) $h \geq 1$ b) $0 < \lambda \leq \frac{1}{2}$

c) $0 \leq \lambda \leq 1$ d) For all finite values of λ

6) Which of the following method is slow method for finding the root of algebraic and transcendental equation f(x) = 0 ?

a) Newton-Raphson method b) False position method

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7) If $y = x^2$, then the first divided difference of the arguments 1 and 2 is

a) 2 b) 3 c) 0 d) 1

8) Using Newton-Raphson method the first approximation to the root of the equation $x^4 - x - 10 = 0$ near to $x_0 = 2$ is

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13) For the data

x :	2	4	6	8
f(x):	3	5	6	7

$\int_2^8 f(x)\,dx$ when found by the trapezoidal rule is

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14) The number of strips required in Weddle's rule is

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Seat No.	

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
NUMERICAL METHODS

Day and Date : Tuesday, 23-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*

*2) Figures to the **right** indicate **full** marks.*

*3) **Use** of calculator is **allowed**.*

SECTION – I

2. Solve the following :

a) Find the positive real root of the equation $x^2 - \log_{10}x - 12 = 0$ correct to three places of decimals using Regula Falsi method. **3**

b) Perform two iterations of Newton-Raphson method to solve the system of non-linear equations $x^2 + y^2 = 4$ and $y + e^x = 1$ starting with $x_0 = 1$, $y_0 = -1.7$ as initial approximations. **4**

c) Find double root near to 1.5 of the equation $x^3 - 5.4x^2 + 9.24x - 5.096 = 0$ by Newton-Raphson method. **3**

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i) Apply Gauss-Jordan method to solve the equations $x + y + z = 9$, $2x - 3y + 4z = 13$, $3x + 4y + 5z = 40$.

ii) Find the largest eigen value and the corresponding eigen vector of the matrix $\begin{bmatrix} 1 & 6 & 1 \\ 1 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ using Power method. Take $[1\ 0\ 0]^T$ as initial eigen vector (perform six iterations).

4. Solve the following :

a) Find cubical function f(x) from the following table using Newton's divided difference formula

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$f(x)$	:	2	3	12	147

3

b) Fit a second degree parabola $y = a + bx + cx^2$ to the following data by least square principle.

x	:	0	1	2	3	4
y	:	1	0	3	10	21

3

c) The line of regression of y on x is $6y = 5x + 90$ and the line of regression of x on y is $15x = 8y + 130$. Find the mean of x and y and the coefficient of correlation. **3**

5. a) Use Lagrange's interpolation formula to find f (6) from the following data :

x	:	3	7	9	10
$f(x)$	:	168	120	72	63

4

b) Find a positive real root of the equation $x^3 - x - 11 = 0$ correct to three places of decimal using Bisection method. **5**

SECTION – II

6. Attempt **any three** from the following : **(3×3=9)**

a) Compute the value of $\int_{0.2}^{1.4} \left(\sin x - \log x + e^x\right) dx$ using Simpson's three-eighth rule, taking seven ordinates.

b) Apply trapezoidal rule to evaluate $\int_1^5 \int_1^5 \frac{dxdy}{\sqrt{x^2 + y^2}}$, taking two-sub-intervals.

c) Using three point Gaussian quadrature formula evaluate $\int_1^2 \frac{1}{1+x^3} dx$.

d) Use Simpson's one-third rule to find $\int_0^{0.6} e^{-x^2} dx$ by taking seven ordinates.

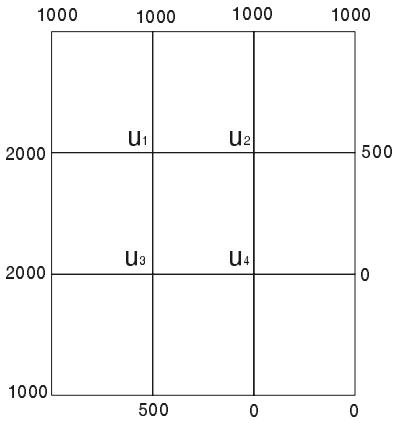
7. a) Apply Picard's method to find the second approximations to the values of y and z, given that $\frac{dy}{dx} = z, \frac{dz}{dx} = x^3(y+z)$, given $y = 1, z = \frac{1}{2}$ at $x = 0$. **4**

   b) Using the finite difference method find y(0.25), y(0.5) and y(0.75) satisfying the differential equation $\frac{d^2y}{dx^2} + y = x$, subject to the boundary conditions y(0) = 0, y(1) = 2. **5**

8. a) Solve the boundary value problem $u_t = u_{xx}$ under the conditions u(0, t) = u(1, t) = 0 and $u(x, 0) = \sin \pi x, 0 \le x \le 1$ using Schmidt method. (Take h = 0.2 and $\alpha = \frac{1}{2}$). **4**

   b) Given $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}, u(0, t) = 0, u(4, t) = 0$ and $u(x, 0) = \frac{x}{3}(16 - x^2)$. Obtain u_{ij} for i = 1, 2, 3, 4 and j = 1, 2 using Crank-Nicholson method. (Take h = 1). **5**

9. a) Evaluate the function u(x, y) satisfying $\nabla^2 u = 0$ at the pivotal points given the boundary values as follows (Take five iterations). **6**



   b) Use Rombergs method to compute $\int_0^1 \frac{dx}{1+x^2}$ correct to four decimal places (Take h = 0.5 and 0.25). **4**

Set S

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Seat No.	

Set P

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Thursday, 25-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **All** questions are **compulsory**.*
*4) Assume suitable data if **necessary**.*
*5) **Separate** answer books for **each** Section.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) When the load is removed the motor that will run at the highest speed is the
   a) Shunt b) Series
   c) Cumulative compound d) Differentially compound

2) Which of the following load would be best driven by a d.c compound motor ?
   a) reciprocating pump b) centrifugal pump
   c) electric locomotive d) fan

3) Speed of the stator field of an induction motor is
   a) Synchronous speed b) Any speed
   c) Less than synchronous d) Slip speed

4) The starting torque of a 3-phase squirrel cage induction motor is
   a) twice the full load torque b) 1.5 times the full load torque
   c) equal to full load torque d) 0.5 times the full load torque

5) Compensating winding is employed in an ac series motor in order to
   a) compensate for decrease in field flux
   b) increase the total torque
   c) reduce the sparking at brushes
   d) reduce effects of armature reaction

6) The rotational speed of a given stepper motor is determined solely by
   a) shaft load b) step pulse frequency
   c) polarity of stator current d) magnitude of stator current

7) The temperature resistance furnaces can be controlled by changing the
   a) applied voltage
   b) number of heating elements
   c) circuit configuration
   d) all of above

8) Ajax Wyatt furnace is started when
   a) it is filled below core level
   b) it is filled above core level
   c) it is fully empty
   d) none of the above

9) A virtual ground is a ground for
   a) Voltage but not for current
   b) Current but not for voltage
   c) Both current and voltage
   d) Neither current nor voltage

10) Closed loop gain of AC inverting and non-inverting amplifier respectively are
   a) – Rf/R1, 1 + Rf/R1
   b) 1 – Rf/R1, Rf/R1
   c) Rf/R, 1 – Rf/R1
   d) – R/Rf, 1 + R1/Rf

11) The number of flip flops needed for Mod 7 counter are
   a) 7 b) 5 c) 3 d) 1

12) The flip-flop which is free from race around problem is
   a) RS FF
   b) Master slave JK FF
   c) JK FF
   d) All

13) 8051 microcontroller has width of address bus and data bus respectively of _____ bits.
   a) 8, 8 b) 8, 16 c) 16, 8 d) none

14) After reset the stack pointer in microcontroller 8051 is initialized to
   a) 70 H b) FF H c) 00 H d) 07 H

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SLR-VB – 88

Seat No.	

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Thursday, 25-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data if ***necessary****.*
3) ***Separate*** *answer books for* ***each*** *Section.*

SECTION – I

2. Attempt **any four** of the following : **(4×4=16)**

a) A 500 V DC Shunt motor runs at its normal speed of 250 rpm when the armature current is 200 A. Calculate the speed when the shunt field is reduced to 80% of normal value and the armature current is 100 A. Take Ra = 0.12 Ω.

b) Explain star-delta starter for three phase induction motor.

c) Write a short note on, "Selection of different types of motors for industrial applications".

d) What are the advantages of electric heating over other systems of heating ? Write properties of resistance heating element material.

e) Discuss dielectric heating.

f) Explain the working of 3 phase induction motor.

3. Attempt **any two** of the following : **(2×6=12)**

a) Explain in detail different characteristics of dc series and dc shunt motor.

b) Derive the torque equation of 3 phase induction motor at standstill condition and solve if a 3 ph 50 Hz, 4 pole, wound rotot IM has a rotor standstill emf per phase of 115 V. If the motor is running at 1440 r.p.m., calculate for this speed

i) The slip

ii) The frequency of the rotor induced emf

iii) Value of the rotor induced emf per phase.

c) Name the most popular types of stepper motors. Describe working principle, construction and application of stepper motor.

SECTION – II

4. Attempt **any four** of the following : **(4×4=16)**
   a) State different application of shift register and explain any application in detail.
   b) What are ideal characteristics of op-amp ? Give block diagram representation of op-amp.
   c) Compare microprocessor and microcontroller.
   d) Explain with detailed circuit diagram, microcontroller based ON OFF controller system.
   e) Explain the working of successive approximation A/D converter.
   f) Explain three input summing amplifier in inverting configuration.
5. Attempt **any two** of the following : **(2×6=12)**
   a) Explain different types of flip flop circuit in detail.
   b) Explain with neat diagram operation of op-amp as differentiator and integrator.
   c) Explain different logical instructions of the microcontroller 8051.

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SLR-VB – 88

Seat No.	

Set Q

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Thursday, 25-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Ajax Wyatt furnace is started when
   a) it is filled below core level
   b) it is filled above core level
   c) it is fully empty
   d) none of the above

2) A virtual ground is a ground for
   a) Voltage but not for current
   b) Current but not for voltage
   c) Both current and voltage
   d) Neither current nor voltage

3) Closed loop gain of AC inverting and non-inverting amplifier respectively are
   a) – Rf/R1, 1 + Rf/R1
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4) The number of flip flops needed for Mod 7 counter are
   a) 7 b) 5 c) 3 d) 1

5) The flip-flop which is free from race around problem is
   a) RS FF
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   c) JK FF
   d) All

6) 8051 microcontroller has width of address bus and data bus respectively of _____ bits.
   a) 8, 8 b) 8, 16 c) 16, 8 d) none

7) After reset the stack pointer in microcontroller 8051 is initialized to
   a) 70 H b) FF H c) 00 H d) 07 H

P.T.O.

8) When the load is removed the motor that will run at the highest speed is the
   a) Shunt
   b) Series
   c) Cumulative compound
   d) Differentially compound

9) Which of the following load would be best driven by a d.c compound motor ?
   a) reciprocating pump
   b) centrifugal pump
   c) electric locomotive
   d) fan

10) Speed of the stator field of an induction motor is
   a) Synchronous speed
   b) Any speed
   c) Less than synchronous
   d) Slip speed

11) The starting torque of a 3-phase squirrel cage induction motor is
   a) twice the full load torque
   b) 1.5 times the full load torque
   c) equal to full load torque
   d) 0.5 times the full load torque

12) Compensating winding is employed in an ac series motor in order to
   a) compensate for decrease in field flux
   b) increase the total torque
   c) reduce the sparking at brushes
   d) reduce effects of armature reaction

13) The rotational speed of a given stepper motor is determined solely by
   a) shaft load
   b) step pulse frequency
   c) polarity of stator current
   d) magnitude of stator current

14) The temperature resistance furnaces can be controlled by changing the
   a) applied voltage
   b) number of heating elements
   c) circuit configuration
   d) all of above

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SLR-VB – 88

Seat No.	

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Thursday, 25-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data if ***necessary****.*
3) ***Separate*** *answer books for* ***each*** *Section.*

SECTION – I

2. Attempt **any four** of the following : **(4×4=16)**

a) A 500 V DC Shunt motor runs at its normal speed of 250 rpm when the armature current is 200 A. Calculate the speed when the shunt field is reduced to 80% of normal value and the armature current is 100 A. Take Ra = 0.12 Ω.

b) Explain star-delta starter for three phase induction motor.

c) Write a short note on, "Selection of different types of motors for industrial applications".

d) What are the advantages of electric heating over other systems of heating ? Write properties of resistance heating element material.

e) Discuss dielectric heating.

f) Explain the working of 3 phase induction motor.

3. Attempt **any two** of the following : **(2×6=12)**

a) Explain in detail different characteristics of dc series and dc shunt motor.

b) Derive the torque equation of 3 phase induction motor at standstill condition and solve if a 3 ph 50 Hz, 4 pole, wound rotot IM has a rotor standstill emf per phase of 115 V. If the motor is running at 1440 r.p.m., calculate for this speed

i) The slip

ii) The frequency of the rotor induced emf

iii) Value of the rotor induced emf per phase.

c) Name the most popular types of stepper motors. Describe working principle, construction and application of stepper motor.

SECTION – II

4. Attempt **any four** of the following : **(4×4=16)**
   a) State different application of shift register and explain any application in detail.
   b) What are ideal characteristics of op-amp ? Give block diagram representation of op-amp.
   c) Compare microprocessor and microcontroller.
   d) Explain with detailed circuit diagram, microcontroller based ON OFF controller system.
   e) Explain the working of successive approximation A/D converter.
   f) Explain three input summing amplifier in inverting configuration.
5. Attempt **any two** of the following : **(2×6=12)**
   a) Explain different types of flip flop circuit in detail.
   b) Explain with neat diagram operation of op-amp as differentiator and integrator.
   c) Explain different logical instructions of the microcontroller 8051.

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SLR-VB – 88

Seat No.	

Set R

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Thursday, 25-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **All** questions are **compulsory**.*
*4) Assume suitable data if **necessary**.*
*5) **Separate** answer books for **each** Section.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Compensating winding is employed in an ac series motor in order to
   a) compensate for decrease in field flux
   b) increase the total torque
   c) reduce the sparking at brushes
   d) reduce effects of armature reaction

2) The rotational speed of a given stepper motor is determined solely by
   a) shaft load b) step pulse frequency
   c) polarity of stator current d) magnitude of stator current

3) The temperature resistance furnaces can be controlled by changing the
   a) applied voltage b) number of heating elements
   c) circuit configuration d) all of above

4) Ajax Wyatt furnace is started when
   a) it is filled below core level b) it is filled above core level
   c) it is fully empty d) none of the above

5) A virtual ground is a ground for
   a) Voltage but not for current b) Current but not for voltage
   c) Both current and voltage d) Neither current nor voltage

6) Closed loop gain of AC inverting and non-inverting amplifier respectively are
   a) – Rf/R1, 1 + Rf/R1 b) 1 – Rf/R1, Rf/R1
   c) Rf/R, 1 – Rf/R1 d) – R/Rf, 1 + R1/Rf

7) The number of flip flops needed for Mod 7 counter are
   a) 7 b) 5 c) 3 d) 1

8) The flip-flop which is free from race around problem is
   a) RS FF b) Master slave JK FF
   c) JK FF d) All

9) 8051 microcontroller has width of address bus and data bus respectively of _____ bits.
   a) 8, 8 b) 8, 16 c) 16, 8 d) none

10) After reset the stack pointer in microcontroller 8051 is initialized to
   a) 70 H b) FF H c) 00 H d) 07 H

11) When the load is removed the motor that will run at the highest speed is the
   a) Shunt b) Series
   c) Cumulative compound d) Differentially compound

12) Which of the following load would be best driven by a d.c compound motor ?
   a) reciprocating pump b) centrifugal pump
   c) electric locomotive d) fan

13) Speed of the stator field of an induction motor is
   a) Synchronous speed b) Any speed
   c) Less than synchronous d) Slip speed

14) The starting torque of a 3-phase squirrel cage induction motor is
   a) twice the full load torque b) 1.5 times the full load torque
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_____

SLR-VB – 88

Seat No.	

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Thursday, 25-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data if ***necessary****.*
3) ***Separate*** *answer books for* ***each*** *Section.*

SECTION – I

2. Attempt **any four** of the following : **(4×4=16)**

a) A 500 V DC Shunt motor runs at its normal speed of 250 rpm when the armature current is 200 A. Calculate the speed when the shunt field is reduced to 80% of normal value and the armature current is 100 A. Take Ra = 0.12 Ω.

b) Explain star-delta starter for three phase induction motor.

c) Write a short note on, "Selection of different types of motors for industrial applications".

d) What are the advantages of electric heating over other systems of heating ? Write properties of resistance heating element material.

e) Discuss dielectric heating.

f) Explain the working of 3 phase induction motor.

3. Attempt **any two** of the following : **(2×6=12)**

a) Explain in detail different characteristics of dc series and dc shunt motor.

b) Derive the torque equation of 3 phase induction motor at standstill condition and solve if a 3 ph 50 Hz, 4 pole, wound rotot IM has a rotor standstill emf per phase of 115 V. If the motor is running at 1440 r.p.m., calculate for this speed

i) The slip

ii) The frequency of the rotor induced emf

iii) Value of the rotor induced emf per phase.

c) Name the most popular types of stepper motors. Describe working principle, construction and application of stepper motor.

SECTION – II

4. Attempt **any four** of the following : **(4×4=16)**
   a) State different application of shift register and explain any application in detail.
   b) What are ideal characteristics of op-amp ? Give block diagram representation of op-amp.
   c) Compare microprocessor and microcontroller.
   d) Explain with detailed circuit diagram, microcontroller based ON OFF controller system.
   e) Explain the working of successive approximation A/D converter.
   f) Explain three input summing amplifier in inverting configuration.
5. Attempt **any two** of the following : **(2×6=12)**
   a) Explain different types of flip flop circuit in detail.
   b) Explain with neat diagram operation of op-amp as differentiator and integrator.
   c) Explain different logical instructions of the microcontroller 8051.

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Seat No.	

Set S

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Thursday, 25-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **All** questions are **compulsory**.*
*4) Assume suitable data if **necessary**.*
*5) **Separate** answer books for **each** Section.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Closed loop gain of AC inverting and non-inverting amplifier respectively are
   a) – Rf/R1, 1 + Rf/R1 b) 1 – Rf/R1, Rf/R1
   c) Rf/R, 1 – Rf/R1 d) – R/Rf, 1 + R1/Rf

2) The number of flip flops needed for Mod 7 counter are
   a) 7 b) 5 c) 3 d) 1

3) The flip-flop which is free from race around problem is
   a) RS FF b) Master slave JK FF
   c) JK FF d) All

4) 8051 microcontroller has width of address bus and data bus respectively of _____ bits.
   a) 8, 8 b) 8, 16 c) 16, 8 d) none

5) After reset the stack pointer in microcontroller 8051 is initialized to
   a) 70 H b) FF H c) 00 H d) 07 H

6) When the load is removed the motor that will run at the highest speed is the
   a) Shunt b) Series
   c) Cumulative compound d) Differentially compound

7) Which of the following load would be best driven by a d.c compound motor ?
   a) reciprocating pump b) centrifugal pump
   c) electric locomotive d) fan

P.T.O.

8) Speed of the stator field of an induction motor is
   a) Synchronous speed
   b) Any speed
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9) The starting torque of a 3-phase squirrel cage induction motor is
   a) twice the full load torque
   b) 1.5 times the full load torque
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   a) compensate for decrease in field flux
   b) increase the total torque
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   d) reduce effects of armature reaction

11) The rotational speed of a given stepper motor is determined solely by
   a) shaft load
   b) step pulse frequency
   c) polarity of stator current
   d) magnitude of stator current

12) The temperature resistance furnaces can be controlled by changing the
   a) applied voltage
   b) number of heating elements
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13) Ajax Wyatt furnace is started when
   a) it is filled below core level
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   c) it is fully empty
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   a) Voltage but not for current
   b) Current but not for voltage
   c) Both current and voltage
   d) Neither current nor voltage

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SLR-VB – 88

Seat No.	

S.E. (Mechanical) (Part – II) (CGPA) Examination, 2017
ELECTRICAL AND ELECTRONICS TECHNOLOGY

Day and Date : Thursday, 25-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Assume suitable data if ***necessary****.*
3) ***Separate*** *answer books for* ***each*** *Section.*

SECTION – I

2. Attempt **any four** of the following : **(4×4=16)**

a) A 500 V DC Shunt motor runs at its normal speed of 250 rpm when the armature current is 200 A. Calculate the speed when the shunt field is reduced to 80% of normal value and the armature current is 100 A. Take Ra = 0.12 Ω.

b) Explain star-delta starter for three phase induction motor.

c) Write a short note on, "Selection of different types of motors for industrial applications".

d) What are the advantages of electric heating over other systems of heating ? Write properties of resistance heating element material.

e) Discuss dielectric heating.

f) Explain the working of 3 phase induction motor.

3. Attempt **any two** of the following : **(2×6=12)**

a) Explain in detail different characteristics of dc series and dc shunt motor.

b) Derive the torque equation of 3 phase induction motor at standstill condition and solve if a 3 ph 50 Hz, 4 pole, wound rotot IM has a rotor standstill emf per phase of 115 V. If the motor is running at 1440 r.p.m., calculate for this speed

i) The slip

ii) The frequency of the rotor induced emf

iii) Value of the rotor induced emf per phase.

c) Name the most popular types of stepper motors. Describe working principle, construction and application of stepper motor.

SECTION – II

4. Attempt **any four** of the following : **(4×4=16)**
   a) State different application of shift register and explain any application in detail.
   b) What are ideal characteristics of op-amp ? Give block diagram representation of op-amp.
   c) Compare microprocessor and microcontroller.
   d) Explain with detailed circuit diagram, microcontroller based ON OFF controller system.
   e) Explain the working of successive approximation A/D converter.
   f) Explain three input summing amplifier in inverting configuration.
5. Attempt **any two** of the following : **(2×6=12)**
   a) Explain different types of flip flop circuit in detail.
   b) Explain with neat diagram operation of op-amp as differentiator and integrator.
   c) Explain different logical instructions of the microcontroller 8051.

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SLR-VB – 89

Seat No.	

Set **P**

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
THEORY OF MACHINE – II

Day and Date : Thursday, 4-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) When circle rolls without slipping on outside of a fixed circle the curve traced by a point on circumference of circle is called as _____
a) Hypocycloidal b) Involute c) Epicycloidal d) Cycloid

2) The product of diametral pitch and circular pitch is _____
a) π b) 1 c) $1/\pi$ d) 2π

3) Train value is _____
a) Ratio of speed of driver to driven b) Ratio of speed of driven to driver
c) Number of gears in train d) Number of idler gears

4) When input and output shaft rotate in same direction, input and output torque rotates in _____
a) Same direction b) No relation
c) Perpendicular direction d) Opposite direction

5) When the aeroplane is taking left turn, when viewed from tail end propeller is rotating in clockwise direction, its effect on it during pitching is _____
a) nose will get lifted b) tail will get lifted
c) no effect d) nose will go down

6) Length of path of contact _____
a) distance between pitch point to point of approach
b) sum of path of approach and path of recess
c) length of arc of contact divided by cosine of pressure angle
d) length of arc contact divided by circular pitch

7) Distance between axis of rotation and CG of mass is _____
   a) radius of gyration
   b) centre distance
   c) radius of plane of rotation
   d) radius of rotation

8) The relation between Fp_{max} and Fs_{max} is _____
   a) $Fs_{max} = 1/n\ Fp_{max}$
   b) $Fp_{max} = \frac{1}{2} Fs_{max}$
   c) $Fp_{max} = 2n.\ Fs_{max}$
   d) $Fp_{max} = 1/n\ Fs_{max}$

9) Deflection of cantilever shaft with UDL is _____
   a) $\delta = Wl^3 / 3El$
   b) $\delta = Wl^4 / 8El$
   c) $\delta = Wl^3 / 48El$
   d) $\delta = 5Wl^4 / 8El$

10) If critical speed of shaft is in rps then the natural frequency of transverse vibration is given as _____
   a) $0.4958/\sqrt{\delta}$ b) $0.4985/\sqrt{\delta}$ c) $0.6585/\sqrt{\delta}$ d) $0.4988/\sqrt{\delta}$

11) A shaft carrying 3 rotors will have _____
   a) three nodes
   b) one node
   c) two nodes
   d) one or two nodes

12) The stresses induced in longitudinal vibrations are _____
   a) shear
   b) bending
   c) tensile and compressive
   d) no stresses

13) Fluctuation of speed is _____
   a) coefficient of fluctuation of speed to mean speed
   b) max fluctuation of speed to mean speed
   c) mean speed to max fluctuation of speed
   d) difference in maximum and minimum speed

14) Balancing of rotating and reciprocating masses of engine is necessary at _____
   a) slow speed
   b) medium speed
   c) high speed
   d) mean speed

_____

SLR-VB – 89

Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
THEORY OF MACHINE – II

Day and Date : Thursday, 4-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of calculator is* ***allowed****.*
3) Figures to the ***right*** *indicate full marks.*
4) Assume additional data, if ***necessary*** *and mention it* ***clearly****.*

SECTION – I

2. a) State and explain Law of Gearing. **5**

   b) Draw sketch of Differential Gear Box. **3**

   c) The wheel of a motor cycle have a total moment of inertia of 2.5 kgm^2 and engine parts have moment inertia of 0.14 kgm^2. The gear ratio is 5 to 1 and axis of rotation of engine crank shaft is parallel to that of rear wheel, which have a diameter of 65 cm. Determine the magnitude and direction of gyroscopic couple when motor cycle rounds a curve of 25 m radius at a speed of 50 km per hour. Total mass of the system is 180 kg and h = 0.6 m. **6**
   Engine parts and wheels rotate in same sense.

3. a) Define Flywheel, coefficient of fluctuation of speed, coefficient of fluctuation of energy **3**

   b) Define right hand screw rule, precessional angular motion, Angle of Heel. **3**

   c) Two mating gear wheels have 20 and 40 involute teeth of 10 mm module and 20° pressure angle. The addendum on each wheel is to be made such a length that line of contact on each side of pitch point has half the maximum possible length. Determine the addendum height for each gear wheel and length of line of contact. If the smaller wheel rotates at 250 rpm. Find the velocity of point of contact along the surface of each tooth at the instant when the tip of the tooth on a smaller wheel is in contact. **8**

4. a) In a simple epicyclic gear train the sun wheel 'S' has t_1 teeth and the annulus 'A' has t_2 teeth (internal). A planet wheel 'P' meshes with 'S' and 'A' and turns on the end of an arm whose axis is coincident with that of 'S' and 'A'. If x and y are speeds of 'S' and 'A' respectively, show that the speed of the arm is $\frac{(t_1x + t_2y)}{t_1 + t_2}$ and hence find the ratio of $\frac{t_2}{t_1}$ when "A" is fixed and arm makes 0.4 revolution for one revolution of 'S'. **8**

   b) In a turning moment diagram, the areas above and below the mean torque line taken in order are 395, 785, 140, 440, 1060 and 370 mm^2, having scales of 1 mm = 5 NM and 1 mm = 10° along Y and X axes respectively. Find mass of flywheel at a radius of gyration 150 mm and mean speed is 1800 rpm. Take coefficient of fluctuation of speed is 3%. **6**

SECTION – II

5. A) Explain primary force and secondary force balancing of reciprocating masses in a single cylinder I.C. Engine. **4**

   B) A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm, and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70°and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions. **10**

6. A) Categories the study of vibration in different types. **6**

   B) A vibrating system is defined by the following parameters m = 3 kg, K = 10 N/m. C = 3 N – sec/m. Determine :
   a) The damping factor
   b) The natural frequency of damped vibration
   c) Logarithmic decrement
   d) The ratio of two consecutive amplitudes **8**

7. A) Write the derivation for force transmissibility. **6**

   B) A shaft in fig. Q. 7B carries two masses. The mass A is 400 kg with radius of gyration of 0.7 m and mass B is 750 kg with a radius of gyration of 0.87 m. Determine the frequency of torsional vibrations. The modulus of rigidity of shaft material is 80 GN/m^2. **8**

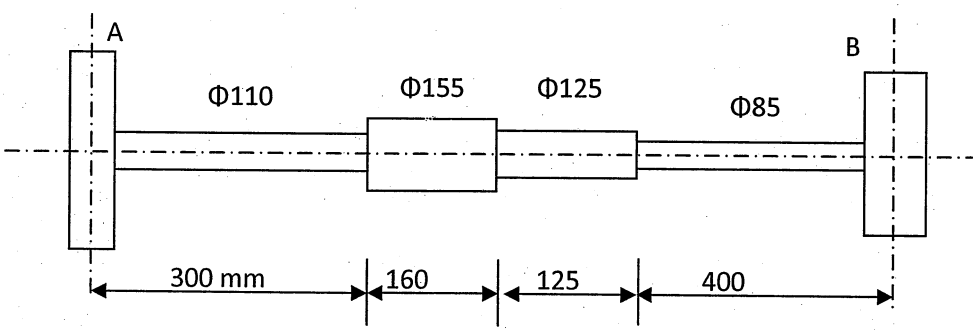

Fig. Q. 7B

Set P

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Seat No.	

Set **Q**

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
THEORY OF MACHINE – II

Day and Date : Thursday, 4-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) The relation between Fp_{max} and Fs_{max} is _____
   a) $Fs_{max} = 1/n\ Fp_{max}$ b) $Fp_{max} = \frac{1}{2} Fs_{max}$
   c) $Fp_{max} = 2n.\ Fs_{max}$ d) $Fp_{max} = 1/n\ Fs_{max}$

2) Deflection of cantilever shaft with UDL is _____
   a) $\delta = Wl^3 / 3El$ b) $\delta = Wl^4 / 8El$
   c) $\delta = Wl^3 / 48El$ d) $\delta = 5Wl^4 / 8El$

3) If critical speed of shaft is in rps then the natural frequency of transverse vibration is given as _____
   a) $0.4958/\sqrt{\delta}$ b) $0.4985/\sqrt{\delta}$ c) $0.6585/\sqrt{\delta}$ d) $0.4988/\sqrt{\delta}$

4) A shaft carrying 3 rotors will have _____
   a) three nodes b) one node
   c) two nodes d) one or two nodes

5) The stresses induced in longitudinal vibrations are _____
   a) shear b) bending
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6) Fluctuation of speed is _____
   a) coefficient of fluctuation of speed to mean speed
   b) max fluctuation of speed to mean speed
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   d) difference in maximum and minimum speed

P.T.O.

7) Balancing of rotating and reciprocating masses of engine is necessary at _____
   a) slow speed b) medium speed
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8) When circle rolls without slipping on outside of a fixed circle the curve traced by a point on circumference of circle is called as _____
   a) Hypocycloidal b) Involute c) Epicycloidal d) Cycloid

9) The product of diametral pitch and circular pitch is _____
   a) π b) 1 c) $1/\pi$ d) 2π

10) Train value is _____
   a) Ratio of speed of driver to driven b) Ratio of speed of driven to driver
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11) When input and output shaft rotate in same direction, input and output torque rotates in _____
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12) When the aeroplane is taking left turn, when viewed from tail end propeller is rotating in clockwise direction, its effect on it during pitching is _____
   a) nose will get lifted b) tail will get lifted
   c) no effect d) nose will go down

13) Length of path of contact _____
   a) distance between pitch point to point of approach
   b) sum of path of approach and path of recess
   c) length of arc of contact divided by cosine of pressure angle
   d) length of arc contact divided by circular pitch

14) Distance between axis of rotation and CG of mass is _____
   a) radius of gyration b) centre distance
   c) radius of plane of rotation d) radius of rotation

_____

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Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
THEORY OF MACHINE – II

Day and Date : Thursday, 4-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
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3) Figures to the ***right*** *indicate full marks.*
4) Assume additional data, if ***necessary*** *and mention it* ***clearly****.*

SECTION – I

2. a) State and explain Law of Gearing. **5**

   b) Draw sketch of Differential Gear Box. **3**

   c) The wheel of a motor cycle have a total moment of inertia of 2.5 kgm^2 and engine parts have moment inertia of 0.14 kgm^2. The gear ratio is 5 to 1 and axis of rotation of engine crank shaft is parallel to that of rear wheel, which have a diameter of 65 cm. Determine the magnitude and direction of gyroscopic couple when motor cycle rounds a curve of 25 m radius at a speed of 50 km per hour. Total mass of the system is 180 kg and h = 0.6 m. **6**
   Engine parts and wheels rotate in same sense.

3. a) Define Flywheel, coefficient of fluctuation of speed, coefficient of fluctuation of energy **3**

   b) Define right hand screw rule, precessional angular motion, Angle of Heel. **3**

   c) Two mating gear wheels have 20 and 40 involute teeth of 10 mm module and 20° pressure angle. The addendum on each wheel is to be made such a length that line of contact on each side of pitch point has half the maximum possible length. Determine the addendum height for each gear wheel and length of line of contact. If the smaller wheel rotates at 250 rpm. Find the velocity of point of contact along the surface of each tooth at the instant when the tip of the tooth on a smaller wheel is in contact. **8**

4. a) In a simple epicyclic gear train the sun wheel 'S' has t_1 teeth and the annulus 'A' has t_2 teeth (internal). A planet wheel 'P' meshes with 'S' and 'A' and turns on the end of an arm whose axis is coincident with that of 'S' and 'A'. If x and y are speeds of 'S' and 'A' respectively, show that the speed of the arm is $\frac{(t_1x + t_2y)}{t_1 + t_2}$ and hence find the ratio of $\frac{t_2}{t_1}$ when "A" is fixed and arm makes 0.4 revolution for one revolution of 'S'. **8**

   b) In a turning moment diagram, the areas above and below the mean torque line taken in order are 395, 785, 140, 440, 1060 and 370 mm^2, having scales of 1 mm = 5 NM and 1 mm = 10° along Y and X axes respectively. Find mass of flywheel at a radius of gyration 150 mm and mean speed is 1800 rpm. Take coefficient of fluctuation of speed is 3%. **6**

SECTION – II

5. A) Explain primary force and secondary force balancing of reciprocating masses in a single cylinder I.C. Engine. **4**

   B) A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm, and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70°and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions. **10**

6. A) Categories the study of vibration in different types. **6**

   B) A vibrating system is defined by the following parameters m = 3 kg, K = 10 N/m. C = 3 N – sec/m. Determine :
   a) The damping factor
   b) The natural frequency of damped vibration
   c) Logarithmic decrement
   d) The ratio of two consecutive amplitudes **8**

7. A) Write the derivation for force transmissibility. **6**

   B) A shaft in fig. Q. 7B carries two masses. The mass A is 400 kg with radius of gyration of 0.7 m and mass B is 750 kg with a radius of gyration of 0.87 m. Determine the frequency of torsional vibrations. The modulus of rigidity of shaft material is 80 GN/m^2. **8**

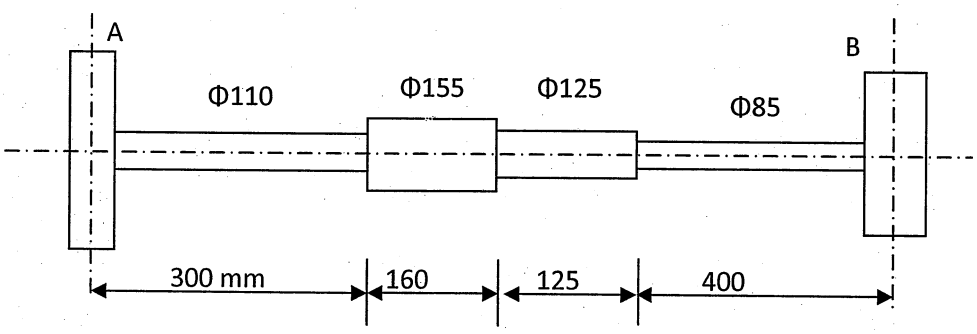

Fig. Q. 7B

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Set Q

SLR-VB – 89

Seat No.	

Set **R**

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
THEORY OF MACHINE – II

Day and Date : Thursday, 4-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) When the aeroplane is taking left turn, when viewed from tail end propeller is rotating in clockwise direction, its effect on it during pitching is _____
   a) nose will get lifted b) tail will get lifted
   c) no effect d) nose will go down

2) Length of path of contact _____
   a) distance between pitch point to point of approach
   b) sum of path of approach and path of recess
   c) length of arc of contact divided by cosine of pressure angle
   d) length of arc contact divided by circular pitch

3) Distance between axis of rotation and CG of mass is _____
   a) radius of gyration b) centre distance
   c) radius of plane of rotation d) radius of rotation

4) The relation between Fp_{max} and Fs_{max} is _____
   a) $Fs_{max} = 1/n\ Fp_{max}$ b) $Fp_{max} = \frac{1}{2} Fs_{max}$
   c) $Fp_{max} = 2n.\ Fs_{max}$ d) $Fp_{max} = 1/n\ Fs_{max}$

5) Deflection of cantilever shaft with UDL is _____
   a) $\delta = Wl^3 / 3EI$ b) $\delta = Wl^4 / 8EI$
   c) $\delta = Wl^3 / 48EI$ d) $\delta = 5Wl^4 / 8EI$

6) If critical speed of shaft is in rps then the natural frequency of transverse vibration is given as _____
   a) $0.4958/\sqrt{\delta}$ b) $0.4985/\sqrt{\delta}$ c) $0.6585/\sqrt{\delta}$ d) $0.4988/\sqrt{\delta}$

P.T.O.

7) A shaft carrying 3 rotors will have _____
   a) three nodes b) one node
   c) two nodes d) one or two nodes

8) The stresses induced in longitudinal vibrations are _____
   a) shear b) bending
   c) tensile and compressive d) no stresses

9) Fluctuation of speed is _____
   a) coefficient of fluctuation of speed to mean speed
   b) max fluctuation of speed to mean speed
   c) mean speed to max fluctuation of speed
   d) difference in maximum and minimum speed

10) Balancing of rotating and reciprocating masses of engine is necessary at _____
   a) slow speed b) medium speed
   c) high speed d) mean speed

11) When circle rolls without slipping on outside of a fixed circle the curve traced by a point on circumference of circle is called as _____
   a) Hypocycloidal b) Involute c) Epicycloidal d) Cycloid

12) The product of diametral pitch and circular pitch is _____
   a) π b) 1 c) $1/\pi$ d) 2π

13) Train value is _____
   a) Ratio of speed of driver to driven b) Ratio of speed of driven to driver
   c) Number of gears in train d) Number of idler gears

14) When input and output shaft rotate in same direction, input and output torque rotates in _____
   a) Same direction b) No relation
   c) Perpendicular direction d) Opposite direction

_____

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Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
THEORY OF MACHINE – II

Day and Date : Thursday, 4-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of calculator is* ***allowed****.*
3) Figures to the ***right*** *indicate full marks.*
4) Assume additional data, if ***necessary*** *and mention it* ***clearly****.*

SECTION – I

2. a) State and explain Law of Gearing. **5**

   b) Draw sketch of Differential Gear Box. **3**

   c) The wheel of a motor cycle have a total moment of inertia of 2.5 kgm^2 and engine parts have moment inertia of 0.14 kgm^2. The gear ratio is 5 to 1 and axis of rotation of engine crank shaft is parallel to that of rear wheel, which have a diameter of 65 cm. Determine the magnitude and direction of gyroscopic couple when motor cycle rounds a curve of 25 m radius at a speed of 50 km per hour. Total mass of the system is 180 kg and h = 0.6 m. **6**
   Engine parts and wheels rotate in same sense.

3. a) Define Flywheel, coefficient of fluctuation of speed, coefficient of fluctuation of energy **3**

   b) Define right hand screw rule, precessional angular motion, Angle of Heel. **3**

   c) Two mating gear wheels have 20 and 40 involute teeth of 10 mm module and 20° pressure angle. The addendum on each wheel is to be made such a length that line of contact on each side of pitch point has half the maximum possible length. Determine the addendum height for each gear wheel and length of line of contact. If the smaller wheel rotates at 250 rpm. Find the velocity of point of contact along the surface of each tooth at the instant when the tip of the tooth on a smaller wheel is in contact. **8**

4. a) In a simple epicyclic gear train the sun wheel 'S' has t_1 teeth and the annulus 'A' has t_2 teeth (internal). A planet wheel 'P' meshes with 'S' and 'A' and turns on the end of an arm whose axis is coincident with that of 'S' and 'A'. If x and y are speeds of 'S' and 'A' respectively, show that the speed of the arm is $\frac{(t_1x + t_2y)}{t_1 + t_2}$ and hence find the ratio of $\frac{t_2}{t_1}$ when "A" is fixed and arm makes 0.4 revolution for one revolution of 'S'. **8**

   b) In a turning moment diagram, the areas above and below the mean torque line taken in order are 395, 785, 140, 440, 1060 and 370 mm^2, having scales of 1 mm = 5 NM and 1 mm = 10° along Y and X axes respectively. Find mass of flywheel at a radius of gyration 150 mm and mean speed is 1800 rpm. Take coefficient of fluctuation of speed is 3%. **6**

SECTION – II

5. A) Explain primary force and secondary force balancing of reciprocating masses in a single cylinder I.C. Engine. **4**

   B) A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm, and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70°and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions. **10**

6. A) Categories the study of vibration in different types. **6**

   B) A vibrating system is defined by the following parameters m = 3 kg, K = 10 N/m. C = 3 N – sec/m. Determine :
   a) The damping factor
   b) The natural frequency of damped vibration
   c) Logarithmic decrement
   d) The ratio of two consecutive amplitudes **8**

7. A) Write the derivation for force transmissibility. **6**

   B) A shaft in fig. Q. 7B carries two masses. The mass A is 400 kg with radius of gyration of 0.7 m and mass B is 750 kg with a radius of gyration of 0.87 m. Determine the frequency of torsional vibrations. The modulus of rigidity of shaft material is 80 GN/m^2. **8**

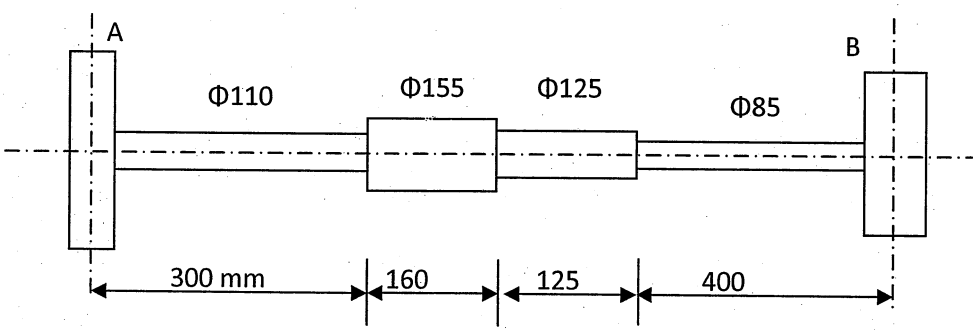

Fig. Q. 7B

Set R

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Seat No.	

Set **S**

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
THEORY OF MACHINE – II

Day and Date : Thursday, 4-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1×14=14)**

1) If critical speed of shaft is in rps then the natural frequency of transverse vibration is given as _____
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a) coefficient of fluctuation of speed to mean speed
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7) The product of diametral pitch and circular pitch is _____
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14) Deflection of cantilever shaft with UDL is _____
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_____

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Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
THEORY OF MACHINE – II

Day and Date : Thursday, 4-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of calculator is* ***allowed****.*
3) Figures to the ***right*** *indicate full marks.*
4) Assume additional data, if ***necessary*** *and mention it* ***clearly****.*

SECTION – I

2. a) State and explain Law of Gearing. **5**

   b) Draw sketch of Differential Gear Box. **3**

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   c) Two mating gear wheels have 20 and 40 involute teeth of 10 mm module and 20° pressure angle. The addendum on each wheel is to be made such a length that line of contact on each side of pitch point has half the maximum possible length. Determine the addendum height for each gear wheel and length of line of contact. If the smaller wheel rotates at 250 rpm. Find the velocity of point of contact along the surface of each tooth at the instant when the tip of the tooth on a smaller wheel is in contact. **8**

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SECTION – II

5. A) Explain primary force and secondary force balancing of reciprocating masses in a single cylinder I.C. Engine. **4**

   B) A shaft carries four masses A, B, C and D of magnitude 200 kg, 300 kg, 400 kg and 200 kg respectively and revolving at radii 80 mm, 70 mm, 60 mm, and 80 mm in planes measured from A at 300 mm, 400 mm and 700 mm. The angles between the cranks measured anticlockwise are A to B 45°, B to C 70°and C to D 120°. The balancing masses are to be placed in planes X and Y. The distance between the planes A and X is 100 mm, between X and Y is 400 mm and between Y and D is 200 mm. If the balancing masses revolve at a radius of 100 mm, find their magnitudes and angular positions. **10**

6. A) Categories the study of vibration in different types. **6**

   B) A vibrating system is defined by the following parameters m = 3 kg, K = 10 N/m. C = 3 N – sec/m. Determine :
   a) The damping factor
   b) The natural frequency of damped vibration
   c) Logarithmic decrement
   d) The ratio of two consecutive amplitudes **8**

7. A) Write the derivation for force transmissibility. **6**

   B) A shaft in fig. Q. 7B carries two masses. The mass A is 400 kg with radius of gyration of 0.7 m and mass B is 750 kg with a radius of gyration of 0.87 m. Determine the frequency of torsional vibrations. The modulus of rigidity of shaft material is 80 GN/m^2. **8**

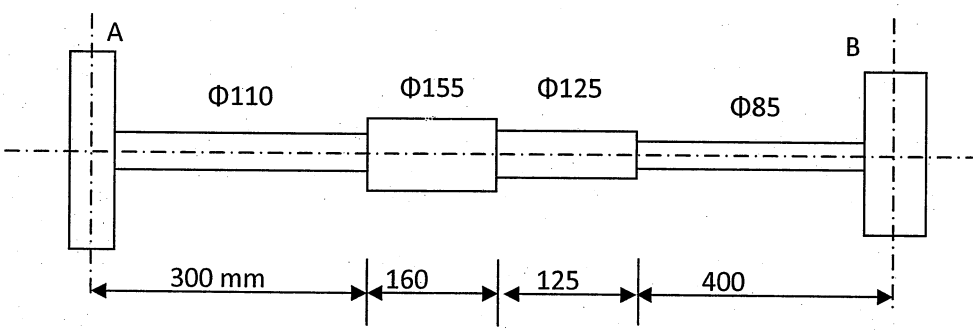

Fig. Q. 7B

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Set S

SLR-VB – 90

Seat No.	

Set P

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
HEAT AND MASS TRANSFER

Day and Date : Friday, 5-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Assume suitable data **if** required.*
*4) Use of scientific calculator is **allowed**.*
*5) Figures to **right** side indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) All the followings are units of thermal conductivity except
   a) kcal/m-hr-°C b) kJ/m-hr-K
   c) W/m-s-K d) cal/cm-s-°C

2) The law governing the distributon of radiant energy over wavelength for a black body at fixed temperature is referred as
   a) Wien's law b) Planck's law
   c) Kirchhoff's law d) Lambert's law

3) In a balanced counter flow heat exchanger with $m_h c_h = m_c c_c$, the NTU is equal to unity what is the effectiveness of heat exchanger ?
   a) 0.5 b) 1.5 c) 0.33 d) 0.2

4) Drop wise Condensation usually occurs on
   a) Glazed surface b) Smooth surface
   c) Oily surface d) Coated surface

5) Which of the following forms of water have the highest value of thermal conductivity ?
   a) Boiling water b) Steam c) Solid ice d) Melting ice

6) The study state temperature distribution in a very large thin plate with uniform surface temperatures will be
   a) Linear b) Hyperbolic c) Parabolic d) Logarithmic

7) In the lumped parameter model, the temperature variation with time is
   a) Linear b) Hyperbolic c) Parabolic d) Exponential

8) Lumped parameter analysis for transient heat conduction is essentially for
   a) Bi < 0.1 b) 0.1 < Bi < 0.5
   c) 1 < Bi < 10 d) Bi number is infinity

9) Absorptivity of a body equals to emissivity
   a) for a polished body b) under thermal equilibrium
   c) at one particular temperature d) at shorter wavelength

10) The free convection heat transfer is significantly affected by
   a) Reynolds number b) Grashoff number
   c) Prandtl number d) Stanton number

11) Value of Prandlt number for air is
   a) 0.1 b) 0.4 c) 0.7 d) 1.1

12) Heat conduction in gases due to
   a) Motion of electrons
   b) Elastic impact of molecules
   c) Mixing motion different layers of gas
   d) Electromagnetic waves

13) Indicates the metal with highest thermal conductivity
   a) Steel b) Silver c) Copper d) Saw dust

14) For s finned surface, it is considered appropriate that area of cross section be
   a) Reduced along length b) Increased along length
   c) Maintained along length d) None

SLR-VB – 90

Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
HEAT AND MASS TRANSFER

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Out of remaining questions, attempt* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if*** *required.*
3) Use of scientific calculator is ***allowed****.*
4) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Solve **any four** out of the following questions : **(4×4=16)**

A) Explain different modes of heat transfer with their governing laws.

B) A mild steel tank (k = 50 W/m°C) of wall thickness 10 mm contains water at 90°C and heat transfer coefficient of inside and outside of tank are 2800 and 11 W/m^2K respectively

i) Rate of heat loss per unit area of tank surface

ii) Temperature of inside and outside of surface tank.

C) Explain Biot number and Fourier number in lumped capacity analysis and give their significance.

D) Derive an expression for critical radius of insulation for sphere.

E) Define Nusselt number, Prandtl number and Reynolds number also give their significance.

F) A cylinder of 8 cm diameter and 15 cm in length having surface temperature 50°C kept vertically in water at 15°C. Find the heat transfer from cylinder if the properties of water at 32.5°C are :

k = 0.615 W/m°C, ρ = 995.7 kg/m^3, Cp = 4.18 kJ/kgK, γ = 0.805×10^{-6} m^2/s, μ = 0.798×10^{-3} kgm/s, Nu = 0.13 $(Pr.Re)^{1/3}$.

3. Solve **any two** out of the following questions : **(2×6=12)**

A) Using the dimensional analysis show that Nu = f(Re, Pr) for forced convection.

B) Derive an expression for one dimensional steady state heat conduction with heat generation for slab.

C) Calculate amount of energy required to solder together two very long pieces of copper wire of 1.5 mm diameter and solder melts at 190°C. The wires are positioned vertically in air at 20°C. Assume heat transfer coefficient on wire surface is 20W/m^2K and thermal conductivity of alloy material is 830 W/mK.

SECTION – II

4. Solve **any four** out of the following questions : **(4×4=16)**

A) Define condensation and explain its types.

B) Explain the following terms with example of radioactive bodies.
   i) Absorptivity
   ii) Reflectivity
   iii) Transmissivity
   iv) Emissivity.

C) Explain different modes of mass transfer.

D) Describe the method to obtain temperature distribution in case of long rectangular thin bar using finite difference method.

E) Explain with neat sketch construction, working and applications of heat pipe.

F) Explain the concept of shape factor, state and explain properties of shape factor.

5. Solve **any two** out of the following questions : **(2×6=12)**

A) Derive an expression for NTU effectiveness method for parallel flow heat exchanger.

B) Consider two large parallel plates; one at 1000 K with emissivity 0.8 and other is at 300 K having emissivity 0.6. A radiation shield is placed between them. The shield has emissivity as 0.1 on the side facing hot plate and 0.3 on the side facing cold plate. Calculate percentage reduction in radiation heat transfer as a result of radiation shield.

C) A counter flow double pipe heat exchanger using superheated steam is used to heat the water at a rate of 3 kg/s. The steam enters the heat exchanger at 180°C and leaves at 130°C. The inlet and exit temperature of water are 30°C and 80°C respectively. The overall heat transfer coefficient is 820W/m^2K. Calculate the heat transfer area required ? What would be increase in area, if fluid flow in parallel ? Assume specific heat of water as 4.187 kJ/kgK.

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SLR-VB – 90

Seat No.	

Set **Q**

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
HEAT AND MASS TRANSFER

Day and Date : Friday, 5-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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*3) Assume suitable data **if** required.*
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*5) Figures to **right** side indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

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   a) Bi < 0.1 b) 0.1 < Bi < 0.5
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2) Absorptivity of a body equals to emissivity
   a) for a polished body b) under thermal equilibrium
   c) at one particular temperature d) at shorter wavelength

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4) Value of Prandlt number for air is
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5) Heat conduction in gases due to
   a) Motion of electrons
   b) Elastic impact of molecules
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P.T.O.

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10) In a balanced counter flow heat exchanger with $m_h c_h = m_c c_c$, the NTU is equal to unity what is the effectiveness of heat exchanger ?
   a) 0.5 b) 1.5 c) 0.33 d) 0.2

11) Drop wise Condensation usually occurs on
   a) Glazed surface b) Smooth surface
   c) Oily surface d) Coated surface

12) Which of the following forms of water have the highest value of thermal conductivity ?
   a) Boiling water b) Steam c) Solid ice d) Melting ice

13) The study state temperature distribution in a very large thin plate with uniform surface temperatures will be
   a) Linear b) Hyperbolic c) Parabolic d) Logarithmic

14) In the lumped parameter model, the temperature variation with time is
   a) Linear b) Hyperbolic c) Parabolic d) Exponential

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SLR-VB – 90

Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
HEAT AND MASS TRANSFER

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Out of remaining questions, attempt* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if*** *required.*
3) Use of scientific calculator is ***allowed****.*
4) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Solve **any four** out of the following questions : **(4×4=16)**

A) Explain different modes of heat transfer with their governing laws.

B) A mild steel tank (k = 50 W/m°C) of wall thickness 10 mm contains water at 90°C and heat transfer coefficient of inside and outside of tank are 2800 and 11 W/m^2K respectively

i) Rate of heat loss per unit area of tank surface

ii) Temperature of inside and outside of surface tank.

C) Explain Biot number and Fourier number in lumped capacity analysis and give their significance.

D) Derive an expression for critical radius of insulation for sphere.

E) Define Nusselt number, Prandtl number and Reynolds number also give their significance.

F) A cylinder of 8 cm diameter and 15 cm in length having surface temperature 50°C kept vertically in water at 15°C. Find the heat transfer from cylinder if the properties of water at 32.5°C are :

k = 0.615 W/m°C, ρ = 995.7 kg/m^3, Cp = 4.18 kJ/kgK, γ = 0.805×10^{-6} m^2/s, μ = 0.798×10^{-3} kgm/s, Nu = 0.13 $(Pr.Re)^{1/3}$.

3. Solve **any two** out of the following questions : **(2×6=12)**

A) Using the dimensional analysis show that Nu = f(Re, Pr) for forced convection.

B) Derive an expression for one dimensional steady state heat conduction with heat generation for slab.

C) Calculate amount of energy required to solder together two very long pieces of copper wire of 1.5 mm diameter and solder melts at 190°C. The wires are positioned vertically in air at 20°C. Assume heat transfer coefficient on wire surface is 20W/m^2K and thermal conductivity of alloy material is 830 W/mK.

SECTION – II

4. Solve **any four** out of the following questions : **(4×4=16)**

A) Define condensation and explain its types.

B) Explain the following terms with example of radioactive bodies.
   i) Absorptivity
   ii) Reflectivity
   iii) Transmissivity
   iv) Emissivity.

C) Explain different modes of mass transfer.

D) Describe the method to obtain temperature distribution in case of long rectangular thin bar using finite difference method.

E) Explain with neat sketch construction, working and applications of heat pipe.

F) Explain the concept of shape factor, state and explain properties of shape factor.

5. Solve **any two** out of the following questions : **(2×6=12)**

A) Derive an expression for NTU effectiveness method for parallel flow heat exchanger.

B) Consider two large parallel plates; one at 1000 K with emissivity 0.8 and other is at 300 K having emissivity 0.6. A radiation shield is placed between them. The shield has emissivity as 0.1 on the side facing hot plate and 0.3 on the side facing cold plate. Calculate percentage reduction in radiation heat transfer as a result of radiation shield.

C) A counter flow double pipe heat exchanger using superheated steam is used to heat the water at a rate of 3 kg/s. The steam enters the heat exchanger at 180°C and leaves at 130°C. The inlet and exit temperature of water are 30°C and 80°C respectively. The overall heat transfer coefficient is 820W/m^2K. Calculate the heat transfer area required ? What would be increase in area, if fluid flow in parallel ? Assume specific heat of water as 4.187 kJ/kgK.

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SLR-VB – 90

Seat No.	

Set R

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
HEAT AND MASS TRANSFER

Day and Date : Friday, 5-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Assume suitable data **if** required.*
*4) Use of scientific calculator is **allowed**.*
*5) Figures to **right** side indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Which of the following forms of water have the highest value of thermal conductivity ?
a) Boiling water b) Steam c) Solid ice d) Melting ice

2) The study state temperature distribution in a very large thin plate with uniform surface temperatures will be
a) Linear b) Hyperbolic c) Parabolic d) Logarithmic

3) In the lumped parameter model, the temperature variation with time is
a) Linear b) Hyperbolic c) Parabolic d) Exponential

4) Lumped parameter analysis for transient heat conduction is essentially for
a) Bi < 0.1 b) 0.1 < Bi < 0.5
c) 1 < Bi < 10 d) Bi number is infinity

5) Absorptivity of a body equals to emissivity
a) for a polished body b) under thermal equilibrium
c) at one particular temperature d) at shorter wavelength

6) The free convection heat transfer is significantly affected by
a) Reynolds number b) Grashoff number
c) Prandtl number d) Stanton number

P.T.O.

7) Value of Prandlt number for air is
   a) 0.1 b) 0.4 c) 0.7 d) 1.1

8) Heat conduction in gases due to
   a) Motion of electrons
   b) Elastic impact of molecules
   c) Mixing motion different layers of gas
   d) Electromagnetic waves

9) Indicates the metal with highest thermal conductivity
   a) Steel b) Silver c) Copper d) Saw dust

10) For s finned surface, it is considered appropriate that area of cross section be
   a) Reduced along length b) Increased along length
   c) Maintained along length d) None

11) All the followings are units of thermal conductivity except
   a) kcal/m-hr-°C b) kJ/m-hr-K
   c) W/m-s-K d) cal/cm-s-°C

12) The law governing the distributon of radiant energy over wavelength for a black body at fixed temperature is referred as
   a) Wien's law b) Planck's law
   c) Kirchhoff's law d) Lambert's law

13) In a balanced counter flow heat exchanger with $m_h c_h = m_c c_c$, the NTU is equal to unity what is the effectiveness of heat exchanger ?
   a) 0.5 b) 1.5 c) 0.33 d) 0.2

14) Drop wise Condensation usually occurs on
   a) Glazed surface b) Smooth surface
   c) Oily surface d) Coated surface

———————

SLR-VB – 90

Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
HEAT AND MASS TRANSFER

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Out of remaining questions, attempt* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if*** *required.*
3) Use of scientific calculator is ***allowed****.*
4) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Solve **any four** out of the following questions : **(4×4=16)**

A) Explain different modes of heat transfer with their governing laws.

B) A mild steel tank (k = 50 W/m°C) of wall thickness 10 mm contains water at 90°C and heat transfer coefficient of inside and outside of tank are 2800 and 11 W/m^2K respectively

i) Rate of heat loss per unit area of tank surface

ii) Temperature of inside and outside of surface tank.

C) Explain Biot number and Fourier number in lumped capacity analysis and give their significance.

D) Derive an expression for critical radius of insulation for sphere.

E) Define Nusselt number, Prandtl number and Reynolds number also give their significance.

F) A cylinder of 8 cm diameter and 15 cm in length having surface temperature 50°C kept vertically in water at 15°C. Find the heat transfer from cylinder if the properties of water at 32.5°C are :

k = 0.615 W/m°C, ρ = 995.7 kg/m^3, Cp = 4.18 kJ/kgK, γ = 0.805×10^{-6} m^2/s, μ = 0.798×10^{-3} kgm/s, Nu = 0.13 $(Pr.Re)^{1/3}$.

3. Solve **any two** out of the following questions : **(2×6=12)**

A) Using the dimensional analysis show that Nu = f(Re, Pr) for forced convection.

B) Derive an expression for one dimensional steady state heat conduction with heat generation for slab.

C) Calculate amount of energy required to solder together two very long pieces of copper wire of 1.5 mm diameter and solder melts at 190°C. The wires are positioned vertically in air at 20°C. Assume heat transfer coefficient on wire surface is 20W/m^2K and thermal conductivity of alloy material is 830 W/mK.

SECTION – II

4. Solve **any four** out of the following questions : **(4×4=16)**

A) Define condensation and explain its types.

B) Explain the following terms with example of radioactive bodies.
   i) Absorptivity
   ii) Reflectivity
   iii) Transmissivity
   iv) Emissivity.

C) Explain different modes of mass transfer.

D) Describe the method to obtain temperature distribution in case of long rectangular thin bar using finite difference method.

E) Explain with neat sketch construction, working and applications of heat pipe.

F) Explain the concept of shape factor, state and explain properties of shape factor.

5. Solve **any two** out of the following questions : **(2×6=12)**

A) Derive an expression for NTU effectiveness method for parallel flow heat exchanger.

B) Consider two large parallel plates; one at 1000 K with emissivity 0.8 and other is at 300 K having emissivity 0.6. A radiation shield is placed between them. The shield has emissivity as 0.1 on the side facing hot plate and 0.3 on the side facing cold plate. Calculate percentage reduction in radiation heat transfer as a result of radiation shield.

C) A counter flow double pipe heat exchanger using superheated steam is used to heat the water at a rate of 3 kg/s. The steam enters the heat exchanger at 180°C and leaves at 130°C. The inlet and exit temperature of water are 30°C and 80°C respectively. The overall heat transfer coefficient is 820W/m^2K. Calculate the heat transfer area required ? What would be increase in area, if fluid flow in parallel ? Assume specific heat of water as 4.187 kJ/kgK.

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SLR-VB – 90

Seat No.	

Set S

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
HEAT AND MASS TRANSFER

Day and Date : Friday, 5-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Assume suitable data **if** required.*
*4) Use of scientific calculator is **allowed**.*
*5) Figures to **right** side indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) The free convection heat transfer is significantly affected by
   a) Reynolds number b) Grashoff number
   c) Prandtl number d) Stanton number

2) Value of Prandlt number for air is
   a) 0.1 b) 0.4 c) 0.7 d) 1.1

3) Heat conduction in gases due to
   a) Motion of electrons
   b) Elastic impact of molecules
   c) Mixing motion different layers of gas
   d) Electromagnetic waves

4) Indicates the metal with highest thermal conductivity
   a) Steel b) Silver c) Copper d) Saw dust

5) For s finned surface, it is considered appropriate that area of cross section be
   a) Reduced along length b) Increased along length
   c) Maintained along length d) None

P.T.O.

6) All the followings are units of thermal conductivity except
   a) kcal/m-hr-°C b) kJ/m-hr-K
   c) W/m-s-K d) cal/cm-s-°C

7) The law governing the distributon of radiant energy over wavelength for a black body at fixed temperature is referred as
   a) Wien's law b) Planck's law
   c) Kirchhoff's law d) Lambert's law

8) In a balanced counter flow heat exchanger with $m_h c_h = m_c c_c$, the NTU is equal to unity what is the effectiveness of heat exchanger ?
   a) 0.5 b) 1.5 c) 0.33 d) 0.2

9) Drop wise Condensation usually occurs on
   a) Glazed surface b) Smooth surface
   c) Oily surface d) Coated surface

10) Which of the following forms of water have the highest value of thermal conductivity ?
   a) Boiling water b) Steam c) Solid ice d) Melting ice

11) The study state temperature distribution in a very large thin plate with uniform surface temperatures will be
   a) Linear b) Hyperbolic c) Parabolic d) Logarithmic

12) In the lumped parameter model, the temperature variation with time is
   a) Linear b) Hyperbolic c) Parabolic d) Exponential

13) Lumped parameter analysis for transient heat conduction is essentially for
   a) Bi < 0.1 b) 0.1 < Bi < 0.5
   c) 1 < Bi < 10 d) Bi number is infinity

14) Absorptivity of a body equals to emissivity
   a) for a polished body b) under thermal equilibrium
   c) at one particular temperature d) at shorter wavelength

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SLR-VB – 90

Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
HEAT AND MASS TRANSFER

Day and Date : Friday, 5-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Out of remaining questions, attempt* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data ***if*** *required.*
3) Use of scientific calculator is ***allowed****.*
4) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

2. Solve **any four** out of the following questions : **(4×4=16)**

A) Explain different modes of heat transfer with their governing laws.

B) A mild steel tank (k = 50 W/m°C) of wall thickness 10 mm contains water at 90°C and heat transfer coefficient of inside and outside of tank are 2800 and 11 W/m^2K respectively

i) Rate of heat loss per unit area of tank surface

ii) Temperature of inside and outside of surface tank.

C) Explain Biot number and Fourier number in lumped capacity analysis and give their significance.

D) Derive an expression for critical radius of insulation for sphere.

E) Define Nusselt number, Prandtl number and Reynolds number also give their significance.

F) A cylinder of 8 cm diameter and 15 cm in length having surface temperature 50°C kept vertically in water at 15°C. Find the heat transfer from cylinder if the properties of water at 32.5°C are :

k = 0.615 W/m°C, ρ = 995.7 kg/m^3, Cp = 4.18 kJ/kgK, γ = 0.805×10^{-6} m^2/s, μ = 0.798×10^{-3} kgm/s, Nu = 0.13 $(Pr.Re)^{1/3}$.

3. Solve **any two** out of the following questions : **(2×6=12)**

A) Using the dimensional analysis show that Nu = f(Re, Pr) for forced convection.

B) Derive an expression for one dimensional steady state heat conduction with heat generation for slab.

C) Calculate amount of energy required to solder together two very long pieces of copper wire of 1.5 mm diameter and solder melts at 190°C. The wires are positioned vertically in air at 20°C. Assume heat transfer coefficient on wire surface is 20W/m^2K and thermal conductivity of alloy material is 830 W/mK.

SECTION – II

4. Solve **any four** out of the following questions : **(4×4=16)**

A) Define condensation and explain its types.

B) Explain the following terms with example of radioactive bodies.
   i) Absorptivity
   ii) Reflectivity
   iii) Transmissivity
   iv) Emissivity.

C) Explain different modes of mass transfer.

D) Describe the method to obtain temperature distribution in case of long rectangular thin bar using finite difference method.

E) Explain with neat sketch construction, working and applications of heat pipe.

F) Explain the concept of shape factor, state and explain properties of shape factor.

5. Solve **any two** out of the following questions : **(2×6=12)**

A) Derive an expression for NTU effectiveness method for parallel flow heat exchanger.

B) Consider two large parallel plates; one at 1000 K with emissivity 0.8 and other is at 300 K having emissivity 0.6. A radiation shield is placed between them. The shield has emissivity as 0.1 on the side facing hot plate and 0.3 on the side facing cold plate. Calculate percentage reduction in radiation heat transfer as a result of radiation shield.

C) A counter flow double pipe heat exchanger using superheated steam is used to heat the water at a rate of 3 kg/s. The steam enters the heat exchanger at 180°C and leaves at 130°C. The inlet and exit temperature of water are 30°C and 80°C respectively. The overall heat transfer coefficient is 820W/m^2K. Calculate the heat transfer area required ? What would be increase in area, if fluid flow in parallel ? Assume specific heat of water as 4.187 kJ/kgK.

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SLR-VB – 91

Seat No.	

Set P

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
METALLURGY

Day and Date : Saturday, 6-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) MCQ with only one answer correct : **(1×6=6)**

1) Which of the following element is austenite stabilizer, when added to steels ?
   a) Silicon b) Manganese
   c) Chromium d) Cobalt

2) Which of the following alloy is given modification treatment ?
   a) Al-Cu alloy b) Cu-Sn alloy
   c) Al-Si alloy d) Cu-Al alloy

3) Nitriding treatment is carried out by heating the steel in the range of _____°C.
   a) 200 – 300°C
   b) 500 – 550°C
   c) 650 – 700°C
   d) Above A_3 temp of steel

4) To measure hardness of hardened and tempered steel, which of the following harness test is recommended ?
   a) Rockwell b) Brinell
   c) Shore's schleroscope d) Vicker's

P.T.O.

5) S-N curve is related to _____ test/phenomenon.
   a) Creep b) Fatigue
   c) Tensile test d) Impact test

6) To produce of powders of Zinc and Cadmium which of the following method is used ?
   a) Atomisation b) Reduction
   c) Carbonyl method d) Condensation from metal vapours

B) MCQ with more than one answer correct : **(2×4=8)**

1) Which of the following phases present in Fe-FE_3C diagram have BCC structure ?
   a) Ferrite b) Austenite
   c) Cementite d) Delta iron

2) Which of the following are proeutectoid constituents present in steels between A_3 and A_1 temperatures ?
   a) Ferrite b) Austenite
   c) Cementite d) Pearlite

3) Which of the following annealing processes are called sub critical annealing ?
   a) Recovery b) Recrystallisation
   c) Homogenisation d) Spherodisation

4) In welding/fabrication industry, which of the following NDT is commonly employed ?
   a) Radiography b) Ultrasonic test
   c) Dye penetrant test d) Magnetic particle test

_____

SLR-VB – 91

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
METALLURGY

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any two** questions from **each** Section.*
*2) **Neat** sketches must be drawn **wherever** necessary.*
*3) Assume additional suitable data **wherever** necessary and mention it **clearly**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Draw Fe-Fe_3C equilibrium diagram. Label all the constituents and temperatures. **6**
   b) Compare between steels and cast irons. **4**
   c) Draw microstructure of Grey Cast iron and S.G. iron. **4**

3. a) Give typical composition, property and application of **any 5** of the following : **10**
      i) Invar
      ii) Hot working tool steel
      iii) Water hardening steels
      iv) Hadfield Mn steel
      v) Naval brass
      vi) Gun metal
      vii) Babbitts.
   b) Compare between Brasses and Bronzes. **4**

4. Answer the following (**any four**) : **14**
   a) What is inoculation ? What is its effect on properties of Cast iron ?
   b) Why eutectic point is called non-variant ?
   c) Draw cooling curve for Hypoeutectic alloy and eutectic alloy.
   d) Why 'W' is essential constituent of HSS ?
   e) Explain the application of nano materials.
   f) Write an account of properties and application of Aluminium bronzes.

SECTION – II

5. a) Draw T-T-T diagram for eutectoid steel. **4**

   b) Super impose following treatment on T-T-T diagram : **6**

      i) Annealing
      ii) Normalising
      iii) Hardening
      iv) Austempering
      v) Martempering
      vi) Patenting.

   c) Enlist various quenching media and their characteristics. **4**

6. a) What is subzero treatment and what is its application ? **3**

   b) Explain the advantages of Nitriding over Carburising. **3**

   c) Explain the advantages of induction hardening over conventional hardening. **3**

   d) Compare between Brinell, Rockwell and Vickers tests. **5**

7. a) Explain the set up for pulse-echo Ultrasonic test, pointing out its advantages and application. **5**

   b) Draw S-N curve for Mild steel and Copper alloys. **3**

   c) Explain sintering process and types of sintering. **3**

   d) Draw flow chart for manufacturing of sintered friction materials. **3**

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SLR-VB – 91

Seat No.	

Set Q

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
METALLURGY

Day and Date : Saturday, 6-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) MCQ with only one answer correct : **(1×6=6)**

1) S-N curve is related to _____ test/phenomenon.
   a) Creep b) Fatigue
   c) Tensile test d) Impact test

2) To produce of powders of Zinc and Cadmium which of the following method is used ?
   a) Atomisation
   b) Reduction
   c) Carbonyl method
   d) Condensation from metal vapours

3) Which of the following element is austenite stabilizer, when added to steels ?
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   c) Chromium d) Cobalt

4) Which of the following alloy is given modification treatment ?
   a) Al-Cu alloy b) Cu-Sn alloy
   c) Al-Si alloy d) Cu-Al alloy

P.T.O.

5) Nitriding treatment is carried out by heating the steel in the range of _____°C.
   a) 200 – 300°C
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   c) 650 – 700°C
   d) Above A_3 temp of steel

6) To measure hardness of hardened and tempered steel, which of the following harness test is recommended ?
   a) Rockwell
   b) Brinell
   c) Shore's schleroscope
   d) Vicker's

B) MCQ with more than one answer correct : **(2×4=8)**

1) In welding/fabrication industry, which of the following NDT is commonly employed ?
   a) Radiography
   b) Ultrasonic test
   c) Dye penetrant test
   d) Magnetic particle test

2) Which of the following phases present in Fe-FE_3C diagram have BCC structure ?
   a) Ferrite
   b) Austenite
   c) Cementite
   d) Delta iron

3) Which of the following are proeutectoid constituents present in steels between A_3 and A_1 temperatures ?
   a) Ferrite
   b) Austenite
   c) Cementite
   d) Pearlite

4) Which of the following annealing processes are called sub critical annealing ?
   a) Recovery
   b) Recrystallisation
   c) Homogenisation
   d) Spherodisation

_____

SLR-VB – 91

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
METALLURGY

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any two** questions from **each** Section.*
*2) **Neat** sketches must be drawn **wherever** necessary.*
*3) Assume additional suitable data **wherever** necessary and mention it **clearly**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Draw Fe-Fe_3C equilibrium diagram. Label all the constituents and temperatures. **6**
   b) Compare between steels and cast irons. **4**
   c) Draw microstructure of Grey Cast iron and S.G. iron. **4**

3. a) Give typical composition, property and application of **any 5** of the following : **10**
      i) Invar
      ii) Hot working tool steel
      iii) Water hardening steels
      iv) Hadfield Mn steel
      v) Naval brass
      vi) Gun metal
      vii) Babbitts.
   b) Compare between Brasses and Bronzes. **4**

4. Answer the following (**any four**) : **14**
   a) What is inoculation ? What is its effect on properties of Cast iron ?
   b) Why eutectic point is called non-variant ?
   c) Draw cooling curve for Hypoeutectic alloy and eutectic alloy.
   d) Why 'W' is essential constituent of HSS ?
   e) Explain the application of nano materials.
   f) Write an account of properties and application of Aluminium bronzes.

Set Q

SECTION – II

5. a) Draw T-T-T diagram for eutectoid steel. **4**

   b) Super impose following treatment on T-T-T diagram : **6**

      i) Annealing
      ii) Normalising
      iii) Hardening
      iv) Austempering
      v) Martempering
      vi) Patenting.

   c) Enlist various quenching media and their characteristics. **4**

6. a) What is subzero treatment and what is its application ? **3**

   b) Explain the advantages of Nitriding over Carburising. **3**

   c) Explain the advantages of induction hardening over conventional hardening. **3**

   d) Compare between Brinell, Rockwell and Vickers tests. **5**

7. a) Explain the set up for pulse-echo Ultrasonic test, pointing out its advantages and application. **5**

   b) Draw S-N curve for Mild steel and Copper alloys. **3**

   c) Explain sintering process and types of sintering. **3**

   d) Draw flow chart for manufacturing of sintered friction materials. **3**

SLR-VB – 91

Seat No.	

Set R

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
METALLURGY

Day and Date : Saturday, 6-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) MCQ with only one answer correct : **(1×6=6)**

1) Nitriding treatment is carried out by heating the steel in the range of _____°C.
   a) 200 – 300°C
   b) 500 – 550°C
   c) 650 – 700°C
   d) Above A_3 temp of steel

2) To measure hardness of hardened and tempered steel, which of the following harness test is recommended ?
   a) Rockwell b) Brinell
   c) Shore's schleroscope d) Vicker's

3) S-N curve is related to _____ test/phenomenon.
   a) Creep b) Fatigue
   c) Tensile test d) Impact test

4) To produce of powders of Zinc and Cadmium which of the following method is used ?
   a) Atomisation b) Reduction
   c) Carbonyl method d) Condensation from metal vapours

P.T.O.

5) Which of the following element is austenite stabilizer, when added to steels ?

a) Silicon b) Manganese

c) Chromium d) Cobalt

6) Which of the following alloy is given modification treatment ?

a) Al-Cu alloy b) Cu-Sn alloy

c) Al-Si alloy d) Cu-Al alloy

B) MCQ with more than one answer correct : **(2×4=8)**

1) Which of the following annealing processes are called sub critical annealing ?

a) Recovery b) Recrystallisation

c) Homogenisation d) Spherodisation

2) In welding/fabrication industry, which of the following NDT is commonly employed ?

a) Radiography b) Ultrasonic test

c) Dye penetrant test d) Magnetic particle test

3) Which of the following phases present in Fe-FE_3C diagram have BCC structure ?

a) Ferrite b) Austenite

c) Cementite d) Delta iron

4) Which of the following are proeutectoid constituents present in steels between A_3 and A_1 temperatures ?

a) Ferrite b) Austenite

c) Cementite d) Pearlite

_____

SLR-VB – 91

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
METALLURGY

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any two** questions from **each** Section.*
*2) **Neat** sketches must be drawn **wherever** necessary.*
*3) Assume additional suitable data **wherever** necessary and mention it **clearly**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Draw Fe-Fe_3C equilibrium diagram. Label all the constituents and temperatures. **6**
   b) Compare between steels and cast irons. **4**
   c) Draw microstructure of Grey Cast iron and S.G. iron. **4**

3. a) Give typical composition, property and application of **any 5** of the following : **10**
      i) Invar
      ii) Hot working tool steel
      iii) Water hardening steels
      iv) Hadfield Mn steel
      v) Naval brass
      vi) Gun metal
      vii) Babbitts.
   b) Compare between Brasses and Bronzes. **4**

4. Answer the following (**any four**) : **14**
   a) What is inoculation ? What is its effect on properties of Cast iron ?
   b) Why eutectic point is called non-variant ?
   c) Draw cooling curve for Hypoeutectic alloy and eutectic alloy.
   d) Why 'W' is essential constituent of HSS ?
   e) Explain the application of nano materials.
   f) Write an account of properties and application of Aluminium bronzes.

Set R

SECTION – II

5. a) Draw T-T-T diagram for eutectoid steel. **4**

   b) Super impose following treatment on T-T-T diagram : **6**

      i) Annealing
      ii) Normalising
      iii) Hardening
      iv) Austempering
      v) Martempering
      vi) Patenting.

   c) Enlist various quenching media and their characteristics. **4**

6. a) What is subzero treatment and what is its application ? **3**

   b) Explain the advantages of Nitriding over Carburising. **3**

   c) Explain the advantages of induction hardening over conventional hardening. **3**

   d) Compare between Brinell, Rockwell and Vickers tests. **5**

7. a) Explain the set up for pulse-echo Ultrasonic test, pointing out its advantages and application. **5**

   b) Draw S-N curve for Mild steel and Copper alloys. **3**

   c) Explain sintering process and types of sintering. **3**

   d) Draw flow chart for manufacturing of sintered friction materials. **3**

SLR-VB – 91

Seat No.	

Set S

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
METALLURGY

Day and Date : Saturday, 6-5-2017 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) MCQ with only one answer correct : **(1×6=6)**

1) To measure hardness of hardened and tempered steel, which of the following harness test is recommended ?
   a) Rockwell b) Brinell
   c) Shore's schleroscope d) Vicker's

2) S-N curve is related to _____ test/phenomenon.
   a) Creep b) Fatigue
   c) Tensile test d) Impact test

3) To produce of powders of Zinc and Cadmium which of the following method is used ?
   a) Atomisation
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   c) Carbonyl method
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4) Which of the following element is austenite stabilizer, when added to steels ?
   a) Silicon b) Manganese
   c) Chromium d) Cobalt

P.T.O.

5) Which of the following alloy is given modification treatment ?

a) Al-Cu alloy b) Cu-Sn alloy

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6) Nitriding treatment is carried out by heating the steel in the range of _____°C.

a) 200 – 300°C

b) 500 – 550°C

c) 650 – 700°C

d) Above A_3 temp of steel

B) MCQ with more than one answer correct : **(2×4=8)**

1) Which of the following are proeutectoid constituents present in steels between A_3 and A_1 temperatures ?

a) Ferrite b) Austenite

c) Cementite d) Pearlite

2) Which of the following annealing processes are called sub critical annealing ?

a) Recovery b) Recrystallisation

c) Homogenisation d) Spherodisation

3) In welding/fabrication industry, which of the following NDT is commonly employed ?

a) Radiography b) Ultrasonic test

c) Dye penetrant test d) Magnetic particle test

4) Which of the following phases present in Fe-FE_3C diagram have BCC structure ?

a) Ferrite b) Austenite

c) Cementite d) Delta iron

_____

SLR-VB – 91

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
METALLURGY

Day and Date : Saturday, 6-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Attempt **any two** questions from **each** Section.*
*2) **Neat** sketches must be drawn **wherever** necessary.*
*3) Assume additional suitable data **wherever** necessary and mention it **clearly**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Draw Fe-Fe_3C equilibrium diagram. Label all the constituents and temperatures. **6**
   b) Compare between steels and cast irons. **4**
   c) Draw microstructure of Grey Cast iron and S.G. iron. **4**

3. a) Give typical composition, property and application of **any 5** of the following : **10**
      i) Invar
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      iii) Water hardening steels
      iv) Hadfield Mn steel
      v) Naval brass
      vi) Gun metal
      vii) Babbitts.
   b) Compare between Brasses and Bronzes. **4**

4. Answer the following (**any four**) : **14**
   a) What is inoculation ? What is its effect on properties of Cast iron ?
   b) Why eutectic point is called non-variant ?
   c) Draw cooling curve for Hypoeutectic alloy and eutectic alloy.
   d) Why 'W' is essential constituent of HSS ?
   e) Explain the application of nano materials.
   f) Write an account of properties and application of Aluminium bronzes.

SECTION – II

5. a) Draw T-T-T diagram for eutectoid steel. **4**

   b) Super impose following treatment on T-T-T diagram : **6**

      i) Annealing
      ii) Normalising
      iii) Hardening
      iv) Austempering
      v) Martempering
      vi) Patenting.

   c) Enlist various quenching media and their characteristics. **4**

6. a) What is subzero treatment and what is its application ? **3**

   b) Explain the advantages of Nitriding over Carburising. **3**

   c) Explain the advantages of induction hardening over conventional hardening. **3**

   d) Compare between Brinell, Rockwell and Vickers tests. **5**

7. a) Explain the set up for pulse-echo Ultrasonic test, pointing out its advantages and application. **5**

   b) Draw S-N curve for Mild steel and Copper alloys. **3**

   c) Explain sintering process and types of sintering. **3**

   d) Draw flow chart for manufacturing of sintered friction materials. **3**

SLR-VB – 92

Seat No.	

Set P

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
MACHINE DESIGN – I

Day and Date : Monday, 8-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Solve multiple correct answers : **(8)**
(Note-**all** responses must be correct, that carries **2** marks otherwise zero marks)

i) Factor of safety can be a ratio of
a) Maximum stress to working or design stress
b) Endurance limit to working stress
c) Working or design stress to maximum stress
d) Lateral strain to linear strain

ii) Shear stress in the helical compression spring is related to
a) Load acting
b) Number of turns
c) Wire diameter
d) Mean coil diameter

iii) For fluctuating stresses/loading
a) Mean stress and amplitude stress is non zero
b) Amplitude stress is zero and mean stress is non zero
c) Problems can be solved by S-N curve
d) Problems can be solved by modified goodman diagram

iv) In machining considerations for forging
a) Avoid after machining
b) Get advantage of direction of fibre lines
c) Maintain the parts under compression
d) Maintain the parts under tension

P.T.O.

B) Solve multiple choice questions i.e. MCQ : **(6)**
(Note-**one** option is correct, that carries **1** mark)

i) As per maximum shear stress theory, Ssy is taken as _____ times Syt.
a) 5 b) 0.5 c) 0.577 d) 0.557

ii) For lever cross section, design is carried out on the basis of
a) Bending b) Torsion c) Buckling d) Bearing

iii) In plain carbon steel 55C4, as per BIS designation
a) Fe is 0.55% and Mangenese is 0.4%
b) Carbon is 0.55% and Mangenese is 0.4%
c) Carbon is 5% and Mangenese is 0.4%
d) None of a, b, c

iv) Axles are generally designed for
a) bending b) shear
c) crushing d) none of the above

v) Nipping in leaf spring is
a) Gap between extra full length leaf and the graduated leaf after assembly
b) Gap between extra full length leaf and the graduated leaf before assembly
c) Type of joint between extra full length leaf and graduated leaf
d) Reduces the buckling effect

vi) Preferable manufacturing method for a crane hook is
a) Casting b) Machining c) Forging d) None of a, b, c

_____

SLR-VB – 92

Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
MACHINE DESIGN – I

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Solve **any two** questions from **each** Section **I** and Section **II**.*
*2) Make necessary assumptions, **if** required and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Use of non-programmable calculator is **permitted**.*

SECTION – I

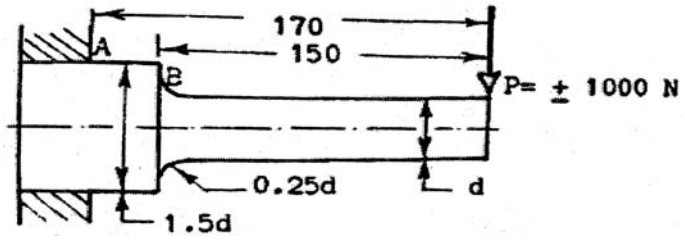
2. a) What are the types of stresses ? **3**

   b) Write the general design procedure of machines. **4**

   c) A right angled bell-crank lever is to design to raise a load of 5 kN at the short arm end. The lengths of the short and long arms are 100 mm and 450 mm resp. The lever and pins are made of steel $30C_8$ (S_{yt} = 400 N/mm^2) and factor of safety is 5. The permissible bearing pressure on the pin is 10 N/mm^2. The lever has rectangular cross-section and the ratio of the width to thickness is 3 : 1. The length to diameter ratio of fulcrum pin is 1.25 : 1. Design the lever. **7**

3. a) What is stress concentration ? What are the causes and reduction methods for stress concentration ? **7**

   b) A cantilever beam made of cold drawn steel 20C8 (S_{ut} = 540 N/mm^2) is subjected to a completely reversed load of 1000 N as shown in Fig. The notch sensitivity factor q at the fillet can be taken as 0.85. **7**
   Ka = surface finish factor = 0.79
   Kb = size factor = 0.85
   Kc – reliability factor = 0.897
   Kt = 1.33
   Determine diameter of shaft for life of 10000 cycles.



4. a) Write down the strength equations for various failure modes to be considered for design of knuckle joint with necessary sketches. **7**

   b) It is required to select a flat belt for a compressor running at 720 r.p.m. which is driven by a 25 kW, 1440 r.p.m. motor. Space is available for a centre distance of 3 m. The belt is open type. **7**

SECTION – II

5. a) Design a muff coupling which is used to connect two steel shafts transmitting 30 kW at 600 r.p.m. The material for the shafts and key is plain carbon steel for which allowable shear and crushing stresses may be taken as 35 MPa and 70 MPa respectively. The material for the muff is cast iron for which the allowable shear stress may be assumed as 14 MPa. **6**

   b) Give the design of a protective type of flanged coupling. **8**

6. a) Discuss the design considerations for machining. **3**

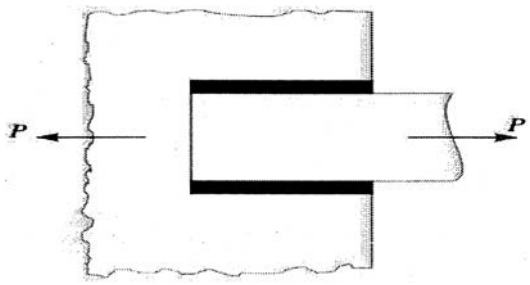
   b) Discuss nipping in leaf spring. **4**

   c) A safety valve of 50 mm diameter is to blow off at a pressure of 1.3 N/mm^2. It is held on its seat by a close coiled helical spring. The maximum life of the valve is 12 mm. Design a suitable compression spring of spring index 6 and providing an initial compression of 30 mm. The maximum shear stress in the material of the wire is limited to 400 MPa. The modulus of rigidity for the spring material is 80 kN/mm^2. Assuming Wahl's factor. Calculate :

      i) Diameter of the spring wire
      ii) Mean coil diameter **7**
      iii) Number of active turns, and
      iv) Pitch of the coil.

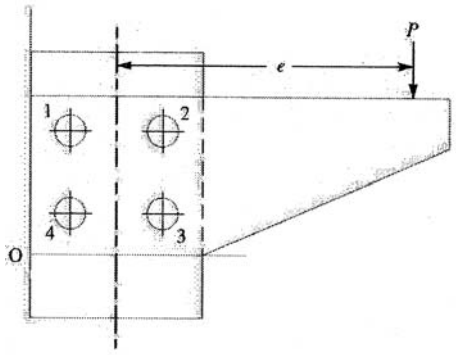
7. a) Discuss design for assembly. **3**

   b) Design the double parallel fillet weld (as shown in Fig.)



4

c) A bracket is riveted to a column as shown in Fig. Give the design procedure for finding the rivet diameter. **7**



Design data for Selection of Flat-Belt

Arc of contact factor

α s	120	130	140	150	160	170	180	190	200
Fd	1.33	1.26	1.19	1.13	1.08	1.04	1.00	0.97	0.94

Standard with of belts

3-Ply	25	40	50	63	76					
4-Ply	40	44	50	63	76	90	100	112	125	152
5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

Power transmitting capacities

HI-SPEED	0.0118 kW per mm width per ply
FORT	0.0147 kW per mm width per ply

Preferred pulley diameters

Pitch diameter (mm)		125	132	140	150	160	170	180	190	200
212	224	236	250	265	280	300	315	355	375	
400	425	450	475	500	530	560	600	630	670	
710	750	800	900	1000						

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Set P

SLR-VB – 92

Seat No.	

Set **Q**

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
MACHINE DESIGN – I

Day and Date : Monday, 8-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Solve multiple correct answers : **(8)**
(Note-**all** responses must be correct, that carries **2** marks otherwise zero marks)

i) In machining considerations for forging
a) Avoid after machining
b) Get advantage of direction of fibre lines
c) Maintain the parts under compression
d) Maintain the parts under tension

ii) For fluctuating stresses/loading
a) Mean stress and amplitude stress is non zero
b) Amplitude stress is zero and mean stress is non zero
c) Problems can be solved by S-N curve
d) Problems can be solved by modified goodman diagram

iii) Shear stress in the helical compression spring is related to
a) Load acting b) Number of turns
c) Wire diameter d) Mean coil diameter

iv) Factor of safety can be a ratio of
a) Maximum stress to working or design stress
b) Endurance limit to working stress
c) Working or design stress to maximum stress
d) Lateral strain to linear strain

P.T.O.

B) Solve multiple choice questions i.e. MCQ : **(6)**
(Note-**one** option is correct, that carries **1** mark)

i) Preferable manufacturing method for a crane hook is
a) Casting b) Machining c) Forging d) None of a, b, c

ii) Nipping in leaf spring is
a) Gap between extra full length leaf and the graduated leaf after assembly
b) Gap between extra full length leaf and the graduated leaf before assembly
c) Type of joint between extra full length leaf and graduated leaf
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iii) Axles are generally designed for
a) bending b) shear
c) crushing d) none of the above

iv) In plain carbon steel 55C4, as per BIS designation
a) Fe is 0.55% and Mangenese is 0.4%
b) Carbon is 0.55% and Mangenese is 0.4%
c) Carbon is 5% and Mangenese is 0.4%
d) None of a, b, c

v) For lever cross section, design is carried out on the basis of
a) Bending b) Torsion c) Buckling d) Bearing

vi) As per maximum shear stress theory, Ssy is taken as _____ times Syt.
a) 5 b) 0.5 c) 0.577 d) 0.557

_____

SLR-VB – 92

Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
MACHINE DESIGN – I

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1) Solve **any two** questions from **each** Section **I** and Section **II**.*
*2) Make necessary assumptions, **if** required and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Use of non-programmable calculator is **permitted**.*

SECTION – I

2. a) What are the types of stresses ? **3**

   b) Write the general design procedure of machines. **4**

   c) A right angled bell-crank lever is to design to raise a load of 5 kN at the short arm end. The lengths of the short and long arms are 100 mm and 450 mm resp. The lever and pins are made of steel $30C_8$ (S_{yt} = 400 N/mm^2) and factor of safety is 5. The permissible bearing pressure on the pin is 10 N/mm^2. The lever has rectangular cross-section and the ratio of the width to thickness is 3 : 1. The length to diameter ratio of fulcrum pin is 1.25 : 1. Design the lever. **7**

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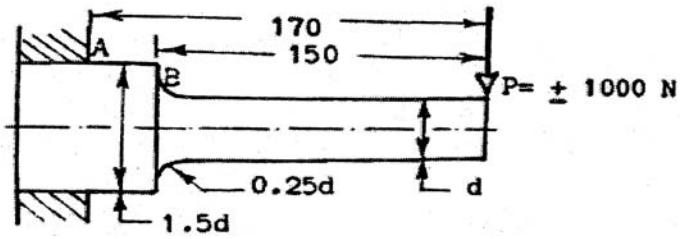
   Determine diameter of shaft for life of 10000 cycles.



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SECTION – II

5. a) Design a muff coupling which is used to connect two steel shafts transmitting 30 kW at 600 r.p.m. The material for the shafts and key is plain carbon steel for which allowable shear and crushing stresses may be taken as 35 MPa and 70 MPa respectively. The material for the muff is cast iron for which the allowable shear stress may be assumed as 14 MPa. **6**

   b) Give the design of a protective type of flanged coupling. **8**

6. a) Discuss the design considerations for machining. **3**

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      i) Diameter of the spring wire
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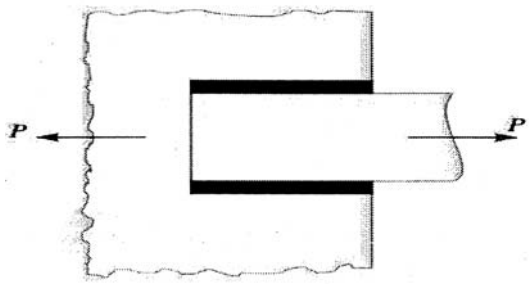
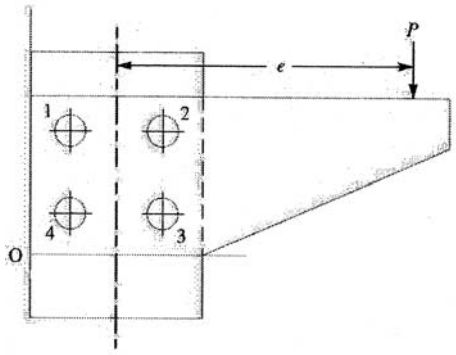


4

c) A bracket is riveted to a column as shown in Fig. Give the design procedure for finding the rivet diameter. **7**



Design data for Selection of Flat-Belt

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5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

Power transmitting capacities

HI-SPEED	0.0118 kW per mm width per ply
FORT	0.0147 kW per mm width per ply

Preferred pulley diameters

Pitch diameter (mm)		125	132	140	150	160	170	180	190	200
212	224	236	250	265	280	300	315	355	375	
400	425	450	475	500	530	560	600	630	670	
710	750	800	900	1000						

Set Q

SLR-VB – 92

Seat No.	

Set R

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
MACHINE DESIGN – I

Day and Date : Monday, 8-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Solve multiple correct answers : **(8)**
(Note-**all** responses must be correct, that carries **2** marks otherwise zero marks)

i) For fluctuating stresses/loading
a) Mean stress and amplitude stress is non zero
b) Amplitude stress is zero and mean stress is non zero
c) Problems can be solved by S-N curve
d) Problems can be solved by modified goodman diagram

ii) Factor of safety can be a ratio of
a) Maximum stress to working or design stress
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c) Working or design stress to maximum stress
d) Lateral strain to linear strain

iii) In machining considerations for forging
a) Avoid after machining
b) Get advantage of direction of fibre lines
c) Maintain the parts under compression
d) Maintain the parts under tension

iv) Shear stress in the helical compression spring is related to
a) Load acting
b) Number of turns
c) Wire diameter
d) Mean coil diameter

P.T.O.

B) Solve multiple choice questions i.e. MCQ : **(6)**
(Note-**one** option is correct, that carries **1** mark)

i) Nipping in leaf spring is
   a) Gap between extra full length leaf and the graduated leaf after assembly
   b) Gap between extra full length leaf and the graduated leaf before assembly
   c) Type of joint between extra full length leaf and graduated leaf
   d) Reduces the buckling effect

ii) As per maximum shear stress theory, Ssy is taken as _____ times Syt.
   a) 5 b) 0.5 c) 0.577 d) 0.557

iii) Preferable manufacturing method for a crane hook is
   a) Casting b) Machining c) Forging d) None of a, b, c

iv) For lever cross section, design is carried out on the basis of
   a) Bending b) Torsion c) Buckling d) Bearing

v) In plain carbon steel 55C4, as per BIS designation
   a) Fe is 0.55% and Mangenese is 0.4%
   b) Carbon is 0.55% and Mangenese is 0.4%
   c) Carbon is 5% and Mangenese is 0.4%
   d) None of a, b, c

vi) Axles are generally designed for
   a) bending b) shear
   c) crushing d) none of the above

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SLR-VB – 92

Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
MACHINE DESIGN – I

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1) Solve **any two** questions from **each** Section **I** and Section **II**.*
*2) Make necessary assumptions, **if** required and mention it **clearly**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Use of non-programmable calculator is **permitted**.*

SECTION – I

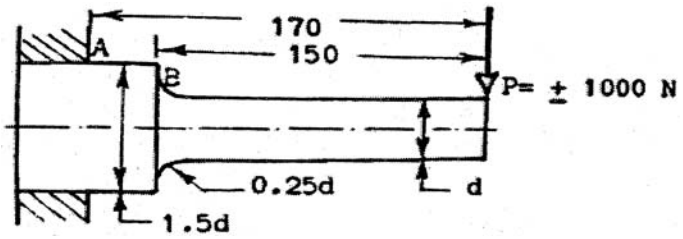
2. a) What are the types of stresses ? **3**

   b) Write the general design procedure of machines. **4**

   c) A right angled bell-crank lever is to design to raise a load of 5 kN at the short arm end. The lengths of the short and long arms are 100 mm and 450 mm resp. The lever and pins are made of steel $30C_8$ (S_{yt} = 400 N/mm^2) and factor of safety is 5. The permissible bearing pressure on the pin is 10 N/mm^2. The lever has rectangular cross-section and the ratio of the width to thickness is 3 : 1. The length to diameter ratio of fulcrum pin is 1.25 : 1. Design the lever. **7**

3. a) What is stress concentration ? What are the causes and reduction methods for stress concentration ? **7**

   b) A cantilever beam made of cold drawn steel 20C8 (S_{ut} = 540 N/mm^2) is subjected to a completely reversed load of 1000 N as shown in Fig. The notch sensitivity factor q at the fillet can be taken as 0.85. **7**
   Ka = surface finish factor = 0.79
   Kb = size factor = 0.85
   Kc – reliability factor = 0.897
   Kt = 1.33
   Determine diameter of shaft for life of 10000 cycles.



4. a) Write down the strength equations for various failure modes to be considered for design of knuckle joint with necessary sketches. **7**

   b) It is required to select a flat belt for a compressor running at 720 r.p.m. which is driven by a 25 kW, 1440 r.p.m. motor. Space is available for a centre distance of 3 m. The belt is open type. **7**

SECTION – II

5. a) Design a muff coupling which is used to connect two steel shafts transmitting 30 kW at 600 r.p.m. The material for the shafts and key is plain carbon steel for which allowable shear and crushing stresses may be taken as 35 MPa and 70 MPa respectively. The material for the muff is cast iron for which the allowable shear stress may be assumed as 14 MPa. **6**

   b) Give the design of a protective type of flanged coupling. **8**

6. a) Discuss the design considerations for machining. **3**

   b) Discuss nipping in leaf spring. **4**

   c) A safety valve of 50 mm diameter is to blow off at a pressure of 1.3 N/mm^2. It is held on its seat by a close coiled helical spring. The maximum life of the valve is 12 mm. Design a suitable compression spring of spring index 6 and providing an initial compression of 30 mm. The maximum shear stress in the material of the wire is limited to 400 MPa. The modulus of rigidity for the spring material is 80 kN/mm^2. Assuming Wahl's factor. Calculate :

      i) Diameter of the spring wire

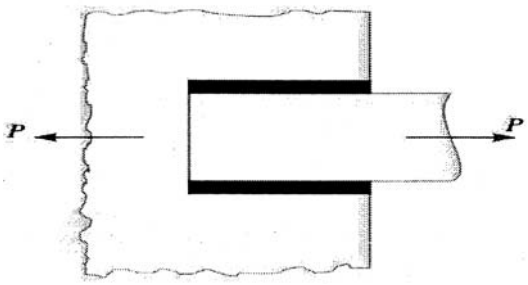
      ii) Mean coil diameter **7**

      iii) Number of active turns, and

      iv) Pitch of the coil.

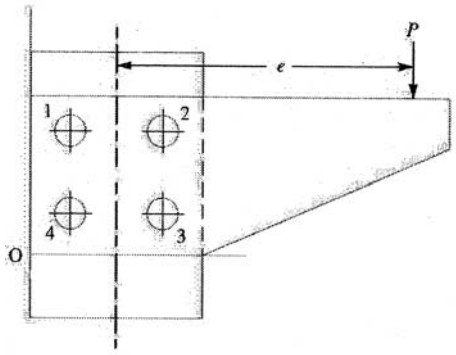
7. a) Discuss design for assembly. **3**

   b) Design the double parallel fillet weld (as shown in Fig.)



4

c) A bracket is riveted to a column as shown in Fig. Give the design procedure for finding the rivet diameter. **7**



Design data for Selection of Flat-Belt

Arc of contact factor

α s	120	130	140	150	160	170	180	190	200
Fd	1.33	1.26	1.19	1.13	1.08	1.04	1.00	0.97	0.94

Standard with of belts

3-Ply	25	40	50	63	76					
4-Ply	40	44	50	63	76	90	100	112	125	152
5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

Power transmitting capacities

HI-SPEED	0.0118 kW per mm width per ply
FORT	0.0147 kW per mm width per ply

Preferred pulley diameters

Pitch diameter (mm)		125	132	140	150	160	170	180	190	200
212	224	236	250	265	280	300	315	355	375	
400	425	450	475	500	530	560	600	630	670	
710	750	800	900	1000						

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Set R

SLR-VB – 92

Seat No.	

Set S

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
MACHINE DESIGN – I

Day and Date : Monday, 8-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Solve multiple correct answers : **(8)**

(Note-**all** responses must be correct, that carries **2** marks otherwise zero marks)

i) Shear stress in the helical compression spring is related to

a) Load acting
b) Number of turns
c) Wire diameter
d) Mean coil diameter

ii) In machining considerations for forging

a) Avoid after machining
b) Get advantage of direction of fibre lines
c) Maintain the parts under compression
d) Maintain the parts under tension

iii) Factor of safety can be a ratio of

a) Maximum stress to working or design stress
b) Endurance limit to working stress
c) Working or design stress to maximum stress
d) Lateral strain to linear strain

iv) For fluctuating stresses/loading

a) Mean stress and amplitude stress is non zero
b) Amplitude stress is zero and mean stress is non zero
c) Problems can be solved by S-N curve
d) Problems can be solved by modified goodman diagram

P.T.O.

B) Solve multiple choice questions i.e. MCQ : **(6)**
(Note-**one** option is correct, that carries **1** mark)

i) Axles are generally designed for
   a) bending b) shear
   c) crushing d) none of the above

ii) In plain carbon steel 55C4, as per BIS designation
   a) Fe is 0.55% and Mangenese is 0.4%
   b) Carbon is 0.55% and Mangenese is 0.4%
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iii) For lever cross section, design is carried out on the basis of
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iv) Preferable manufacturing method for a crane hook is
   a) Casting b) Machining c) Forging d) None of a, b, c

v) As per maximum shear stress theory, Ssy is taken as _____ times Syt.
   a) 5 b) 0.5 c) 0.577 d) 0.557

vi) Nipping in leaf spring is
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   b) Gap between extra full length leaf and the graduated leaf before assembly
   c) Type of joint between extra full length leaf and graduated leaf
   d) Reduces the buckling effect

_____

SLR-VB – 92

Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
MACHINE DESIGN – I

Day and Date : Monday, 8-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions: *1) Solve **any two** questions from **each** Section **I** and Section **II**.*
*2) Make necessary assumptions, **if** required and mention it **clearly**.*
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*4) Use of non-programmable calculator is **permitted**.*

SECTION – I

2. a) What are the types of stresses ? **3**

   b) Write the general design procedure of machines. **4**

   c) A right angled bell-crank lever is to design to raise a load of 5 kN at the short arm end. The lengths of the short and long arms are 100 mm and 450 mm resp. The lever and pins are made of steel $30C_8$ (S_{yt} = 400 N/mm^2) and factor of safety is 5. The permissible bearing pressure on the pin is 10 N/mm^2. The lever has rectangular cross-section and the ratio of the width to thickness is 3 : 1. The length to diameter ratio of fulcrum pin is 1.25 : 1. Design the lever. **7**

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   Ka = surface finish factor = 0.79
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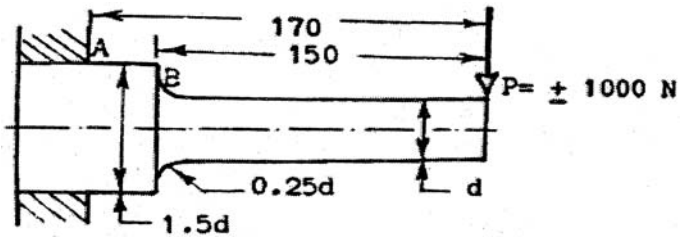

4. a) Write down the strength equations for various failure modes to be considered for design of knuckle joint with necessary sketches. **7**

   b) It is required to select a flat belt for a compressor running at 720 r.p.m. which is driven by a 25 kW, 1440 r.p.m. motor. Space is available for a centre distance of 3 m. The belt is open type. **7**

SECTION – II

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7. a) Discuss design for assembly. **3**

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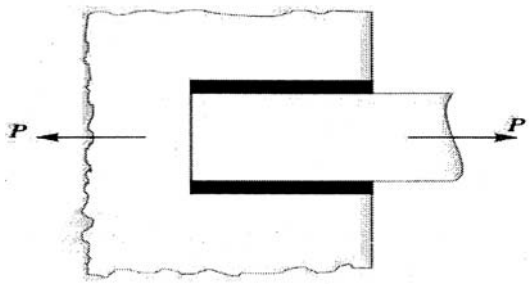

4

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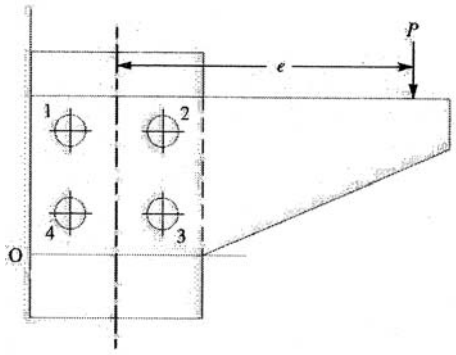

Design data for Selection of Flat-Belt

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Standard with of belts

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5-Ply	76	100	112	125	152					
6-Ply	112	125	152	180	200					

Power transmitting capacities

HI-SPEED	0.0118 kW per mm width per ply
FORT	0.0147 kW per mm width per ply

Preferred pulley diameters

Pitch diameter (mm)									
125	132	140	150	160	170	180	190	200	
212	224	236	250	265	280	300	315	355	375
400	425	450	475	500	530	560	600	630	670
710	750	800	900	1000					

Set S

SLR-VB – 93

Seat No.	

Set P

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** :1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

A) Match the pairs : **4**

Machine tool	Workpiece movement
a) Lathe machine	p) stationary
b) Milling machine	q) rotary
c) Drilling machine	r) intermittent translatory
d) Shaping machine	s) translatory

B) Objective type questions.

1) Which of the following is positive drive ?
   a) V belt drive b) Cross flat belt drive
   c) Rope drive d) Chain drive

2) | Symbol indicates in control panel
   a) On b) Off
   c) On-off d) None of the above

3) The limiting value of transmission intervals for $1.06\varnothing = 1.06$ in speed reduction is
   a) 4 b) 6 c) 12 d) 24

4) For surface grinding machine the type of slide way profile is
   a) open V + open V b) closed V + closed V
   c) open flat + open V d) closed flat + closed V

P.T.O.

5) What is the function of cone pulley drive in lathe machines ?

a) Drive the lead screw b) Change the spindle speed

c) Drive the tail-stock d) All of the above

6) In hydrodynamic journal bearing, the recommended L/D ratio is

a) >1 b) <1 c) 1 d) 0.121

7) ! Symbol indicates in control panel

a) On b) Off c) On-off d) Attention

8) Which of the following is a mechanism for mechanized movements of the carriage along longitudinal axis ?

a) Cross-slide b) Compound rest

c) Apron d) Saddle

9) The efficiency of ball screw is

a) 90% b) 95% c) 80% d) 85%

10) The limiting value of transmission intervals for $1.06\varnothing = 1.06$ in speed increment is

a) 2 b) 6 c) 3 d) 12

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SLR-VB – 93

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) **Use** of calculator is allowed.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assume additional suitable data, **if necessary** and mention it **clearly**.*

SECTION – I

2. a) Explain in detail working and auxiliary motions in machine tools. **7**

   b) What are the materials for machine tool structures ? Explain in brief giving example for each. **7**

3. a) Explain step less regulation in PIV drives with neat sketch. **7**

   b) Compare the stiffness of different sections having equal cross sectional area in machine tool structure. **7**

4. Write short note on the following **(any three)** : **14**

   i) Layout of machine tools

   ii) Design of feed box

   iii) Overall compliance of machine tool

   iv) Design of Aerostatic slideways.

SECTION – II

5. a) Explain spindle nose with neat sketches. **7**

   b) Describe dynamic characteristics of elements and systems. **7**

Set P

6. a) Explain ergonomic aspects of design for various machine tool control elements. **7**

   b) What are the trends and developments in machine tool design ? **7**

7. Write short note on the following **(any three)** : **14**

   i) Bearings for spindles

   ii) Forced vibrations of machine tools

   iii) Spindle unit and requirements

   iv) Design of antifriction slideways.

SLR-VB – 93

Seat No.	

Set Q

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** :1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

A) Objective type questions.

1) The efficiency of ball screw is

a) 90% b) 95% c) 80% d) 85%

2) The limiting value of transmission intervals for $1.06\varnothing = 1.06$ in speed increment is

a) 2 b) 6 c) 3 d) 12

3) ! Symbol indicates in control panel

a) On b) Off c) On-off d) Attention

4) Which of the following is a mechanism for mechanized movements of the carriage along longitudinal axis ?

a) Cross-slide b) Compound rest
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5) Which of the following is positive drive ?

a) V belt drive b) Cross flat belt drive
c) Rope drive d) Chain drive

6) | Symbol indicates in control panel

a) On b) Off
c) On-off d) None of the above

P.T.O.

7) The limiting value of transmission intervals for $1.06\varnothing = 1.06$ in speed reduction is

a) 4 b) 6 c) 12 d) 24

8) For surface grinding machine the type of slide way profile is

a) open V + open V b) closed V + closed V

c) open flat + open V d) closed flat + closed V

9) What is the function of cone pulley drive in lathe machines ?

a) Drive the lead screw b) Change the spindle speed

c) Drive the tail-stock d) All of the above

10) In hydrodynamic journal bearing, the recommended L/D ratio is

a) >1 b) <1 c) 1 d) 0.121

B) Match the pairs : **4**

Machine tool	**Workpiece movement**
a) Lathe machine	p) stationary
b) Milling machine	q) rotary
c) Drilling machine	r) intermittent translatory
d) Shaping machine	s) translatory

SLR-VB – 93

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
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SECTION – I

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   b) What are the materials for machine tool structures ? Explain in brief giving example for each. **7**

3. a) Explain step less regulation in PIV drives with neat sketch. **7**

   b) Compare the stiffness of different sections having equal cross sectional area in machine tool structure. **7**

4. Write short note on the following **(any three)** : **14**

   i) Layout of machine tools

   ii) Design of feed box

   iii) Overall compliance of machine tool

   iv) Design of Aerostatic slideways.

SECTION – II

5. a) Explain spindle nose with neat sketches. **7**

   b) Describe dynamic characteristics of elements and systems. **7**

Set Q

6. a) Explain ergonomic aspects of design for various machine tool control elements. **7**

   b) What are the trends and developments in machine tool design ? **7**

7. Write short note on the following **(any three)** : **14**

   i) Bearings for spindles

   ii) Forced vibrations of machine tools

   iii) Spindle unit and requirements

   iv) Design of antifriction slideways.

SLR-VB – 93

Seat No.	

Set R

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** :1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

A) Match the pairs : **4**

Machine tool	Workpiece movement
a) Lathe machine	p) stationary
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B) Objective type questions.

1) What is the function of cone pulley drive in lathe machines ?

a) Drive the lead screw b) Change the spindle speed

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2) In hydrodynamic journal bearing, the recommended L/D ratio is

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P.T.O.

5) The limiting value of transmission intervals for $1.06\varnothing = 1.06$ in speed reduction is

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6) For surface grinding machine the type of slide way profile is

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7) Which of the following is positive drive ?

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10) Which of the following is a mechanism for mechanized movements of the carriage along longitudinal axis ?

a) Cross-slide b) Compound rest

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SLR-VB – 93

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

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Set R

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SLR-VB – 93

Seat No.	

Set S

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** :1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

A) Objective type questions.

1) The limiting value of transmission intervals for $1.06^{\varnothing} = 1.06$ in speed reduction is

a) 4 b) 6 c) 12 d) 24

2) For surface grinding machine the type of slide way profile is

a) open V + open V b) closed V + closed V

c) open flat + open V d) closed flat + closed V

3) What is the function of cone pulley drive in lathe machines ?

a) Drive the lead screw b) Change the spindle speed

c) Drive the tail-stock d) All of the above

4) In hydrodynamic journal bearing, the recommended L/D ratio is

a) >1 b) <1 c) 1 d) 0.121

5) ! Symbol indicates in control panel

a) On b) Off c) On-off d) Attention

6) Which of the following is a mechanism for mechanized movements of the carriage along longitudinal axis ?

a) Cross-slide b) Compound rest

c) Apron d) Saddle

P.T.O.

7) The efficiency of ball screw is

a) 90% b) 95% c) 80% d) 85%

8) The limiting value of transmission intervals for $1.06\varnothing = 1.06$ in speed increment is

a) 2 b) 6 c) 3 d) 12

9) Which of the following is positive drive ?

a) V belt drive b) Cross flat belt drive

c) Rope drive d) Chain drive

10) | Symbol indicates in control panel

a) On b) Off

c) On-off d) None of the above

B) Match the pairs : **4**

Machine tool	**Workpiece movement**
a) Lathe machine	p) stationary
b) Milling machine	q) rotary
c) Drilling machine	r) intermittent translatory
d) Shaping machine	s) translatory

SLR-VB – 93

Seat No.	

T.E. (Mechanical Engineering) (Part – I) (CGPA) Examination, 2017
Professional Elective – I
MACHINE TOOL DESIGN

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) **Use** of calculator is allowed.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assume additional suitable data, **if necessary** and mention it **clearly**.*

SECTION – I

2. a) Explain in detail working and auxiliary motions in machine tools. **7**

   b) What are the materials for machine tool structures ? Explain in brief giving example for each. **7**

3. a) Explain step less regulation in PIV drives with neat sketch. **7**

   b) Compare the stiffness of different sections having equal cross sectional area in machine tool structure. **7**

4. Write short note on the following **(any three)** : **14**

   i) Layout of machine tools

   ii) Design of feed box

   iii) Overall compliance of machine tool

   iv) Design of Aerostatic slideways.

SECTION – II

5. a) Explain spindle nose with neat sketches. **7**

   b) Describe dynamic characteristics of elements and systems. **7**

Set S

6. a) Explain ergonomic aspects of design for various machine tool control elements. **7**

   b) What are the trends and developments in machine tool design ? **7**

7. Write short note on the following **(any three)** : **14**

   i) Bearings for spindles

   ii) Forced vibrations of machine tools

   iii) Spindle unit and requirements

   iv) Design of antifriction slideways.

SLR-VB – 94

Seat No.	

Set P

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
PROFESSIONAL (Elective – I)
Fluid Machinery and Fluid Power

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **Use** of non-programmable calculators is **permitted**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1 Mark Each)**

1) In gas turbine, intercooler is placed
   a) before low pressure compressor
   b) in between low pressure compressor and high pressure compressor
   c) in between high pressure compressor and turbine
   d) none of the above

2) In gas turbine, the function of Re-heater is to
   a) Heat inlet air
   b) Heat exhaust gases
   c) Heat air coming out of compressor
   d) Heat gases coming out of high pressure turbine

3) In case of centrifugal pump, efficiency of vortex casing is _____ the efficiency of only volute casing.
   a) Less than b) More than
   c) Equal to d) None of the above

4) The _____ acts as a reversed of an inward radial flow reaction turbine.
   a) Centrifugal pump b) Francis Turbine
   c) Pelton wheel d) Kaplan turbine

P.T.O.

5) An overall efficiency of centrifugal pump is the ratio of
   a) Output power of the pump to the power of the impeller
   b) Output power of the pump to the inlet power
   c) Power of the impeller to the input of power
   d) None of the above

6) The cavitation in turbine is caused by
   a) High velocity b) Low pressure
   c) High pressure d) Low barometric pressure

7) In Francis turbine, the discharge leaves the runner radially at the exit. For this turbine
   a) The blade tip is radially at the outlet
   b) The blade tip is radially at inlet
   c) The guide vane angle is 90°
   d) The absolute velocity is radial at the outlet

8) Direction control valve are used to
   a) Control pressure of fluid b) Control fluid flow
   c) Direct fluid flow d) Direct and control fluid flow

9) Seals are made up of
   a) Rubber b) M S Sheets
   c) All of the above d) None of above

10) For single acting cylinder _____ D.C. valve is used.
   a) 5/2 b) 4/2 c) 3/2 d) None of above

11) Time Delay valve is
   a) Pneumatic Flow Control Valve
   b) Hydraulic Flow Control Valve
   c) Pneumatic Pressure Control Valve
   d) Hydraulic Pressure Control Valve

12) In _____ circuit, oil returning from cylinder is only controlled.
   a) Meter in b) Meter out c) 'a' and 'b' d) None of above

13) Pressure rating for Aluminium pipe is _____
   a) 250 bar b) 125 bar c) 200 bar d) 2500-4500 bar

14) Accumulators are
   a) intensifier
   b) actuators
   c) storage reservoirs
   d) devices which receives, stores and supplies fluid

_____

SLR-VB – 94

Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
PROFESSIONAL (Elective – I)
Fluid Machinery and Fluid Power

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) **Draw** neat sketches **wherever** necessary.*
*3) **Use** of non-programmable calculators is **permitted**.*

SECTION – I

2. a) A Pelton wheel is having a mean bucket diameter of 1 m and is running at 1000 r.p.m. The net head on the Pelton wheel is 700 m. If the side clearance angle is 15° and discharge through nozzle is 0.1m^3/s, take C_v = 1.0, find :
   i) Power available at the nozzle, and
   ii) Hydraulic efficiency of the turbine. **5**

   b) What are the disadvantages of a closed cycle gas turbine over open cycle gas turbine ? **4**

   c) A Kaplan turbine working under a head of 20 m develops 11772 kW shaft power. The outer diameter of the runner is 3.5 m and hub diameter 1.75 m. The guide blade angle at the extreme edge of the runner is 35°. The hydraulic and overall efficiencies of the turbines are 88% and 84% respectively. If the velocity of whirl is zero at outlet, determine :
   i) Runner vane angles at inlet and outlet at the extreme edge of the runner.
   ii) Speed of the turbine. **5**

3. a) A gas turbine works on an ideal Brayton cycle. The initial condition of the air is 25°C and 1 bar. The maximum pressure and temperature are limited to 3 bar and 650°C. Determine the following :
   i) Cycle efficiency
   ii) Heat supplied and heat rejected per kg of air. **5**

b) The internal and external diameters of the impeller of a centrifugal pump are 200 mm, 400 mm respectively. The pump is running at 1200 r.p.m. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by impeller per unit weight of water. **5**

c) Obtain an expression for the work done per second by water on the runner of a Pelton wheel. **4**

4. a) A Kaplan turbine develops 24647.6 kW power at an average head of 39 meters. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and an overall efficiency of 90%, calculate the diameter, speed and specific speed of the turbine. **5**

b) What is the difference between single-stage and multi-stage pumps ? Describe multistage pump with impellers in parallel. **5**

c) Explain governing of Pelton turbine. **4**

SECTION – II

5. a) Explain construction, working of Vane type pump. **4**

b) Explain with neat sketch of Regenerative circuit. **5**

c) Explain with neat sketch of 3/2 direction control valve used in hydraulic system. **5**

6. a) Explain with neat sketch of Time Delay Circuit. **5**

b) Explain construction and working of Pilot Operated Sequence Valve used in hydraulic system. **5**

c) Explain Weight Loaded and Spring Loaded Accumulators. **4**

7. a) Explain the Selection Criteria of Compressor. **4**

b) Explain with neat sketch of Air Lubricator. **5**

c) Explain about various material used for seal along with application. **5**

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Seat No.	

Set Q

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
PROFESSIONAL (Elective – I)
Fluid Machinery and Fluid Power

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **Use** of non-programmable calculators is **permitted**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1 Mark Each)**

1) Direction control valve are used to
   a) Control pressure of fluid b) Control fluid flow
   c) Direct fluid flow d) Direct and control fluid flow

2) Seals are made up of
   a) Rubber b) M S Sheets
   c) All of the above d) None of above

3) For single acting cylinder _____ D.C. valve is used.
   a) 5/2 b) 4/2 c) 3/2 d) None of above

4) Time Delay valve is
   a) Pneumatic Flow Control Valve
   b) Hydraulic Flow Control Valve
   c) Pneumatic Pressure Control Valve
   d) Hydraulic Pressure Control Valve

5) In _____ circuit, oil returning from cylinder is only controlled.
   a) Meter in b) Meter out c) 'a' and 'b' d) None of above

6) Pressure rating for Aluminium pipe is _____
   a) 250 bar b) 125 bar c) 200 bar d) 2500-4500 bar

P.T.O.

7) Accumulators are
   a) intensifier
   b) actuators
   c) storage reservoirs
   d) devices which receives, stores and supplies fluid

8) In gas turbine, intercooler is placed
   a) before low pressure compressor
   b) in between low pressure compressor and high pressure compressor
   c) in between high pressure compressor and turbine
   d) none of the above

9) In gas turbine, the function of Re-heater is to
   a) Heat inlet air
   b) Heat exhaust gases
   c) Heat air coming out of compressor
   d) Heat gases coming out of high pressure turbine

10) In case of centrifugal pump, efficiency of vortex casing is _____ the efficiency of only volute casing.
   a) Less than
   b) More than
   c) Equal to
   d) None of the above

11) The _____ acts as a reversed of an inward radial flow reaction turbine.
   a) Centrifugal pump
   b) Francis Turbine
   c) Pelton wheel
   d) Kaplan turbine

12) An overall efficiency of centrifugal pump is the ratio of
   a) Output power of the pump to the power of the impeller
   b) Output power of the pump to the inlet power
   c) Power of the impeller to the input of power
   d) None of the above

13) The cavitation in turbine is caused by
   a) High velocity
   b) Low pressure
   c) High pressure
   d) Low barometric pressure

14) In Francis turbine, the discharge leaves the runner radially at the exit. For this turbine
   a) The blade tip is radially at the outlet
   b) The blade tip is radially at inlet
   c) The guide vane angle is 90°
   d) The absolute velocity is radial at the outlet

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Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
PROFESSIONAL (Elective – I)
Fluid Machinery and Fluid Power

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) **Draw** neat sketches **wherever** necessary.*
*3) **Use** of non-programmable calculators is **permitted**.*

SECTION – I

2. a) A Pelton wheel is having a mean bucket diameter of 1 m and is running at 1000 r.p.m. The net head on the Pelton wheel is 700 m. If the side clearance angle is 15° and discharge through nozzle is 0.1m^3/s, take C_v = 1.0, find :
   i) Power available at the nozzle, and
   ii) Hydraulic efficiency of the turbine. **5**

   b) What are the disadvantages of a closed cycle gas turbine over open cycle gas turbine ? **4**

   c) A Kaplan turbine working under a head of 20 m develops 11772 kW shaft power. The outer diameter of the runner is 3.5 m and hub diameter 1.75 m. The guide blade angle at the extreme edge of the runner is 35°. The hydraulic and overall efficiencies of the turbines are 88% and 84% respectively. If the velocity of whirl is zero at outlet, determine :
   i) Runner vane angles at inlet and outlet at the extreme edge of the runner.
   ii) Speed of the turbine. **5**

3. a) A gas turbine works on an ideal Brayton cycle. The initial condition of the air is 25°C and 1 bar. The maximum pressure and temperature are limited to 3 bar and 650°C. Determine the following :
   i) Cycle efficiency
   ii) Heat supplied and heat rejected per kg of air. **5**

b) The internal and external diameters of the impeller of a centrifugal pump are 200 mm, 400 mm respectively. The pump is running at 1200 r.p.m. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by impeller per unit weight of water. **5**

c) Obtain an expression for the work done per second by water on the runner of a Pelton wheel. **4**

4. a) A Kaplan turbine develops 24647.6 kW power at an average head of 39 meters. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and an overall efficiency of 90%, calculate the diameter, speed and specific speed of the turbine. **5**

b) What is the difference between single-stage and multi-stage pumps ? Describe multistage pump with impellers in parallel. **5**

c) Explain governing of Pelton turbine. **4**

SECTION – II

5. a) Explain construction, working of Vane type pump. **4**

b) Explain with neat sketch of Regenerative circuit. **5**

c) Explain with neat sketch of 3/2 direction control valve used in hydraulic system. **5**

6. a) Explain with neat sketch of Time Delay Circuit. **5**

b) Explain construction and working of Pilot Operated Sequence Valve used in hydraulic system. **5**

c) Explain Weight Loaded and Spring Loaded Accumulators. **4**

7. a) Explain the Selection Criteria of Compressor. **4**

b) Explain with neat sketch of Air Lubricator. **5**

c) Explain about various material used for seal along with application. **5**

SLR-VB – 94

Seat No.	

Set R

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
PROFESSIONAL (Elective – I)
Fluid Machinery and Fluid Power

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **Use** of non-programmable calculators is **permitted**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1 Mark Each)**

1) An overall efficiency of centrifugal pump is the ratio of
   a) Output power of the pump to the power of the impeller
   b) Output power of the pump to the inlet power
   c) Power of the impeller to the input of power
   d) None of the above

2) The cavitation in turbine is caused by
   a) High velocity b) Low pressure
   c) High pressure d) Low barometric pressure

3) In Francis turbine, the discharge leaves the runner radially at the exit. For this turbine
   a) The blade tip is radially at the outlet
   b) The blade tip is radially at inlet
   c) The guide vane angle is 90°
   d) The absolute velocity is radial at the outlet

4) Direction control valve are used to
   a) Control pressure of fluid b) Control fluid flow
   c) Direct fluid flow d) Direct and control fluid flow

5) Seals are made up of
   a) Rubber b) M S Sheets
   c) All of the above d) None of above

P.T.O.

6) For single acting cylinder _____ D.C. valve is used.
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7) Time Delay valve is
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   c) Pneumatic Pressure Control Valve
   d) Hydraulic Pressure Control Valve

8) In _____ circuit, oil returning from cylinder is only controlled.
   a) Meter in b) Meter out c) 'a' and 'b' d) None of above

9) Pressure rating for Aluminium pipe is _____
   a) 250 bar b) 125 bar c) 200 bar d) 2500-4500 bar

10) Accumulators are
   a) intensifier
   b) actuators
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   a) before low pressure compressor
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   a) Heat inlet air
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13) In case of centrifugal pump, efficiency of vortex casing is _____ the efficiency of only volute casing.
   a) Less than b) More than
   c) Equal to d) None of the above

14) The _____ acts as a reversed of an inward radial flow reaction turbine.
   a) Centrifugal pump b) Francis Turbine
   c) Pelton wheel d) Kaplan turbine

_____

SLR-VB – 94

Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
PROFESSIONAL (Elective – I)
Fluid Machinery and Fluid Power

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) **Draw** neat sketches **wherever** necessary.*
*3) **Use** of non-programmable calculators is **permitted**.*

SECTION – I

2. a) A Pelton wheel is having a mean bucket diameter of 1 m and is running at 1000 r.p.m. The net head on the Pelton wheel is 700 m. If the side clearance angle is 15° and discharge through nozzle is 0.1m^3/s, take C_v = 1.0, find :
   i) Power available at the nozzle, and
   ii) Hydraulic efficiency of the turbine. **5**

   b) What are the disadvantages of a closed cycle gas turbine over open cycle gas turbine ? **4**

   c) A Kaplan turbine working under a head of 20 m develops 11772 kW shaft power. The outer diameter of the runner is 3.5 m and hub diameter 1.75 m. The guide blade angle at the extreme edge of the runner is 35°. The hydraulic and overall efficiencies of the turbines are 88% and 84% respectively. If the velocity of whirl is zero at outlet, determine :
   i) Runner vane angles at inlet and outlet at the extreme edge of the runner.
   ii) Speed of the turbine. **5**

3. a) A gas turbine works on an ideal Brayton cycle. The initial condition of the air is 25°C and 1 bar. The maximum pressure and temperature are limited to 3 bar and 650°C. Determine the following :
   i) Cycle efficiency
   ii) Heat supplied and heat rejected per kg of air. **5**

b) The internal and external diameters of the impeller of a centrifugal pump are 200 mm, 400 mm respectively. The pump is running at 1200 r.p.m. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by impeller per unit weight of water. **5**

c) Obtain an expression for the work done per second by water on the runner of a Pelton wheel. **4**

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b) What is the difference between single-stage and multi-stage pumps ? Describe multistage pump with impellers in parallel. **5**

c) Explain governing of Pelton turbine. **4**

SECTION – II

5. a) Explain construction, working of Vane type pump. **4**

b) Explain with neat sketch of Regenerative circuit. **5**

c) Explain with neat sketch of 3/2 direction control valve used in hydraulic system. **5**

6. a) Explain with neat sketch of Time Delay Circuit. **5**

b) Explain construction and working of Pilot Operated Sequence Valve used in hydraulic system. **5**

c) Explain Weight Loaded and Spring Loaded Accumulators. **4**

7. a) Explain the Selection Criteria of Compressor. **4**

b) Explain with neat sketch of Air Lubricator. **5**

c) Explain about various material used for seal along with application. **5**

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Seat No.	

Set S

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
PROFESSIONAL (Elective – I)
Fluid Machinery and Fluid Power

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) **Use** of non-programmable calculators is **permitted**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(1 Mark Each)**

1) For single acting cylinder _____ D.C. valve is used.
a) 5/2 b) 4/2 c) 3/2 d) None of above

2) Time Delay valve is
a) Pneumatic Flow Control Valve
b) Hydraulic Flow Control Valve
c) Pneumatic Pressure Control Valve
d) Hydraulic Pressure Control Valve

3) In _____ circuit, oil returning from cylinder is only controlled.
a) Meter in b) Meter out c) 'a' and 'b' d) None of above

4) Pressure rating for Aluminium pipe is _____
a) 250 bar b) 125 bar c) 200 bar d) 2500-4500 bar

5) Accumulators are
a) intensifier
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6) In gas turbine, intercooler is placed
   a) before low pressure compressor
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   c) Equal to d) None of the above

9) The _____ acts as a reversed of an inward radial flow reaction turbine.
   a) Centrifugal pump b) Francis Turbine
   c) Pelton wheel d) Kaplan turbine

10) An overall efficiency of centrifugal pump is the ratio of
   a) Output power of the pump to the power of the impeller
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   c) Power of the impeller to the input of power
   d) None of the above

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   a) High velocity b) Low pressure
   c) High pressure d) Low barometric pressure

12) In Francis turbine, the discharge leaves the runner radially at the exit. For this turbine
   a) The blade tip is radially at the outlet
   b) The blade tip is radially at inlet
   c) The guide vane angle is 90°
   d) The absolute velocity is radial at the outlet

13) Direction control valve are used to
   a) Control pressure of fluid b) Control fluid flow
   c) Direct fluid flow d) Direct and control fluid flow

14) Seals are made up of
   a) Rubber b) M S Sheets
   c) All of the above d) None of above

SLR-VB – 94

Seat No.	

T.E. (Mechanical) (Part – I) (CGPA) Examination, 2017
PROFESSIONAL (Elective – I)
Fluid Machinery and Fluid Power

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) **Draw** neat sketches **wherever** necessary.*
*3) **Use** of non-programmable calculators is **permitted**.*

SECTION – I

2. a) A Pelton wheel is having a mean bucket diameter of 1 m and is running at 1000 r.p.m. The net head on the Pelton wheel is 700 m. If the side clearance angle is 15° and discharge through nozzle is 0.1m^3/s, take C_v = 1.0, find :
   i) Power available at the nozzle, and
   ii) Hydraulic efficiency of the turbine. **5**

   b) What are the disadvantages of a closed cycle gas turbine over open cycle gas turbine ? **4**

   c) A Kaplan turbine working under a head of 20 m develops 11772 kW shaft power. The outer diameter of the runner is 3.5 m and hub diameter 1.75 m. The guide blade angle at the extreme edge of the runner is 35°. The hydraulic and overall efficiencies of the turbines are 88% and 84% respectively. If the velocity of whirl is zero at outlet, determine :
   i) Runner vane angles at inlet and outlet at the extreme edge of the runner.
   ii) Speed of the turbine. **5**

3. a) A gas turbine works on an ideal Brayton cycle. The initial condition of the air is 25°C and 1 bar. The maximum pressure and temperature are limited to 3 bar and 650°C. Determine the following :
   i) Cycle efficiency
   ii) Heat supplied and heat rejected per kg of air. **5**

b) The internal and external diameters of the impeller of a centrifugal pump are 200 mm, 400 mm respectively. The pump is running at 1200 r.p.m. The vane angles of the impeller at inlet and outlet are 20° and 30° respectively. The water enters the impeller radially and velocity of flow is constant. Determine the work done by impeller per unit weight of water. **5**

c) Obtain an expression for the work done per second by water on the runner of a Pelton wheel. **4**

4. a) A Kaplan turbine develops 24647.6 kW power at an average head of 39 meters. Assuming a speed ratio of 2, flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and an overall efficiency of 90%, calculate the diameter, speed and specific speed of the turbine. **5**

b) What is the difference between single-stage and multi-stage pumps ? Describe multistage pump with impellers in parallel. **5**

c) Explain governing of Pelton turbine. **4**

SECTION – II

5. a) Explain construction, working of Vane type pump. **4**

b) Explain with neat sketch of Regenerative circuit. **5**

c) Explain with neat sketch of 3/2 direction control valve used in hydraulic system. **5**

6. a) Explain with neat sketch of Time Delay Circuit. **5**

b) Explain construction and working of Pilot Operated Sequence Valve used in hydraulic system. **5**

c) Explain Weight Loaded and Spring Loaded Accumulators. **4**

7. a) Explain the Selection Criteria of Compressor. **4**

b) Explain with neat sketch of Air Lubricator. **5**

c) Explain about various material used for seal along with application. **5**

SLR-VB – 95

Seat No.	

Set P

T.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MATERIAL HANDLING SYSTEM
(Professional Elective – I)

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternative : **14**

1) _____ vibrates at a lower frequency and larger amplitude in order to convey larger objects.
   a) Screw conveyors b) Magnetic conveyors
   c) Oscillating conveyors d) None of these

2) The equipment used to move material from one location to another is called as _____ equipment.
   a) Positioning b) Transporting
   c) Storage d) AGV

3) Flat belt conveyor is used for transporting _____ and _____ weight loads.
   a) Heavy and Bulky b) Light and Heavy
   c) Light and Medium d) Medium and Bulky

4) Loads are supported by arms in _____ rack.
   a) Sliding b) Push back
   c) Drive in d) Cantilever

5) As the distance or time factor increases, the cost per unit of product handled
   a) Increases b) Decreases c) Same d) None of these

P.T.O.

6) There are three basic characteristics of material handling, picking up the load, transporting the load and
   a) Catching the load
   b) Rush the load
   c) Setting the load down
   d) Up the load

7) In AGV systems _____ guide path on the floor used for guidance.
   a) Variable b) Physical c) Circular d) None of these

8) From to chart gives the information about
   a) Density of moves between departments
   b) Equipment
   c) Selection procedure
   d) None of these

9) Symbol "O" represents for
   a) Operation b) Store c) Inspection d) Movement

10) _____ common fork lift truck accidents are considered in material handling system.
   a) Five b) Seven c) One d) Ten

11) Assembly chart show
   a) Lay out of the product
   b) Sequence in which component are assembled
   c) Figure components
   d) None of these

12) Equipment evaluation sheet consists of the material characteristics, utilization and
   a) Safety
   b) Vendor characteristics
   c) Flexibility
   d) Unit load

13) Process layout is also known as _____ layout.
   a) Line b) Functional c) Fixed d) All of these

14) _____ is the technique used to measure qualitative flow measurement.
   a) Activity relationship chart
   b) Flow process chart
   c) From to chart
   d) None of these

_____

SLR-VB – 95

Seat No.	

T.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MATERIAL HANDLING SYSTEM
(Professional Elective – I)

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Draw ***neat*** *diagram* ***where*** *necessary.*
3) Solve ***any two*** *questions in* ***each*** *Section.*

SECTION – I

2. a) Explain principles of material handling system in industry. **5**
   b) Explain any two types of cranes with neat figure. **5**
   c) Explain the concept of unit load. **4**

3. a) What is the meaning of "positioning equipments" ? Explain any two types of positioning equipments with figure. **5**
   b) Explain the need of CIMS in material handling. **5**
   c) Explain any two types of industrial trucks with neat figure. **4**

4. Write a short notes **(any three)** : **14**
   a) Industrial Robot. **5**
   b) Benefits of CIMS over conventional system. **5**
   c) Types of racks. **5**
   d) Conveying equipments. **4**

SECTION – II

5. a) Explain the general procedure of selection of material handling equipments. **5**
   b) Explain with figure various types of flow patterns. **5**
   c) Explain the need of safety and training in industry. **4**

6. a) Describe different activities at the receiving to improve efficiency of MHS. **5**
   b) Explain with figure From-to chart. **4**
   c) Explain the selection of material handling equipments in foundry. **5**

7. Write short notes on **(any three)** : **14**
   a) Factors affecting on selection of material handling equipments. **5**
   b) Activity relationship chart. **5**
   c) Material handling equation. **5**
   d) General safety regulations for conveyors. **4**

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SLR-VB – 95

Seat No.	

Set Q

T.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MATERIAL HANDLING SYSTEM
(Professional Elective – I)

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternative : **14**

1) From to chart gives the information about
   a) Density of moves between departments
   b) Equipment
   c) Selection procedure
   d) None of these

2) Symbol "O" represents for
   a) Operation b) Store c) Inspection d) Movement

3) _____ common fork lift truck accidents are considered in material handling system.
   a) Five b) Seven c) One d) Ten

4) Assembly chart show
   a) Lay out of the product
   b) Sequence in which component are assembled
   c) Figure components
   d) None of these

P.T.O.

5) Equipment evaluation sheet consists of the material characteristics, utilization and
   a) Safety
   b) Vendor characteristics
   c) Flexibility
   d) Unit load

6) Process layout is also known as _____ layout.
   a) Line
   b) Functional
   c) Fixed
   d) All of these

7) _____ is the technique used to measure qualitative flow measurement.
   a) Activity relationship chart
   b) Flow process chart
   c) From to chart
   d) None of these

8) _____ vibrates at a lower frequency and larger amplitude in order to convey larger objects.
   a) Screw conveyors
   b) Magnetic conveyors
   c) Oscillating conveyors
   d) None of these

9) The equipment used to move material from one location to another is called as _____ equipment.
   a) Positioning
   b) Transporting
   c) Storage
   d) AGV

10) Flat belt conveyor is used for transporting _____ and _____ weight loads.
   a) Heavy and Bulky
   b) Light and Heavy
   c) Light and Medium
   d) Medium and Bulky

11) Loads are supported by arms in _____ rack.
   a) Sliding
   b) Push back
   c) Drive in
   d) Cantilever

12) As the distance or time factor increases, the cost per unit of product handled
   a) Increases
   b) Decreases
   c) Same
   d) None of these

13) There are three basic characteristics of material handling, picking up the load, transporting the load and
   a) Catching the load
   b) Rush the load
   c) Setting the load down
   d) Up the load

14) In AGV systems _____ guide path on the floor used for guidance.
   a) Variable
   b) Physical
   c) Circular
   d) None of these

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SLR-VB – 95

Seat No.	

T.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MATERIAL HANDLING SYSTEM
(Professional Elective – I)

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Draw ***neat*** *diagram* ***where*** *necessary.*
3) Solve ***any two*** *questions in* ***each*** *Section.*

SECTION – I

2. a) Explain principles of material handling system in industry. **5**
   b) Explain any two types of cranes with neat figure. **5**
   c) Explain the concept of unit load. **4**

3. a) What is the meaning of "positioning equipments" ? Explain any two types of positioning equipments with figure. **5**
   b) Explain the need of CIMS in material handling. **5**
   c) Explain any two types of industrial trucks with neat figure. **4**

4. Write a short notes **(any three)** : **14**
   a) Industrial Robot. **5**
   b) Benefits of CIMS over conventional system. **5**
   c) Types of racks. **5**
   d) Conveying equipments. **4**

Set Q

SECTION – II

5. a) Explain the general procedure of selection of material handling equipments. **5**
   b) Explain with figure various types of flow patterns. **5**
   c) Explain the need of safety and training in industry. **4**

6. a) Describe different activities at the receiving to improve efficiency of MHS. **5**
   b) Explain with figure From-to chart. **4**
   c) Explain the selection of material handling equipments in foundry. **5**

7. Write short notes on **(any three)** : **14**
   a) Factors affecting on selection of material handling equipments. **5**
   b) Activity relationship chart. **5**
   c) Material handling equation. **5**
   d) General safety regulations for conveyors. **4**

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SLR-VB – 95

Seat No.	

Set R

T.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MATERIAL HANDLING SYSTEM
(Professional Elective – I)

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternative : **14**

1) As the distance or time factor increases, the cost per unit of product handled
   a) Increases b) Decreases c) Same d) None of these

2) There are three basic characteristics of material handling, picking up the load, transporting the load and
   a) Catching the load b) Rush the load
   c) Setting the load down d) Up the load

3) In AGV systems _____ guide path on the floor used for guidance.
   a) Variable b) Physical c) Circular d) None of these

4) From to chart gives the information about
   a) Density of moves between departments
   b) Equipment
   c) Selection procedure
   d) None of these

5) Symbol "O" represents for
   a) Operation b) Store c) Inspection d) Movement

P.T.O.

6) _____ common fork lift truck accidents are considered in material handling system.
   a) Five b) Seven c) One d) Ten

7) Assembly chart show
   a) Lay out of the product
   b) Sequence in which component are assembled
   c) Figure components
   d) None of these

8) Equipment evaluation sheet consists of the material characteristics, utilization and
   a) Safety b) Vendor characteristics
   c) Flexibility d) Unit load

9) Process layout is also known as _____ layout.
   a) Line b) Functional c) Fixed d) All of these

10) _____ is the technique used to measure qualitative flow measurement.
   a) Activity relationship chart b) Flow process chart
   c) From to chart d) None of these

11) _____ vibrates at a lower frequency and larger amplitude in order to convey larger objects.
   a) Screw conveyors b) Magnetic conveyors
   c) Oscillating conveyors d) None of these

12) The equipment used to move material from one location to another is called as _____ equipment.
   a) Positioning b) Transporting
   c) Storage d) AGV

13) Flat belt conveyor is used for transporting _____ and _____ weight loads.
   a) Heavy and Bulky b) Light and Heavy
   c) Light and Medium d) Medium and Bulky

14) Loads are supported by arms in _____ rack.
   a) Sliding b) Push back
   c) Drive in d) Cantilever

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SLR-VB – 95

Seat No.	

T.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MATERIAL HANDLING SYSTEM
(Professional Elective – I)

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Draw ***neat*** *diagram* ***where*** *necessary.*
3) Solve ***any two*** *questions in* ***each*** *Section.*

SECTION – I

2. a) Explain principles of material handling system in industry. **5**
   b) Explain any two types of cranes with neat figure. **5**
   c) Explain the concept of unit load. **4**

3. a) What is the meaning of "positioning equipments" ? Explain any two types of positioning equipments with figure. **5**
   b) Explain the need of CIMS in material handling. **5**
   c) Explain any two types of industrial trucks with neat figure. **4**

4. Write a short notes **(any three)** : **14**
   a) Industrial Robot. **5**
   b) Benefits of CIMS over conventional system. **5**
   c) Types of racks. **5**
   d) Conveying equipments. **4**

Set R

SECTION – II

5. a) Explain the general procedure of selection of material handling equipments. **5**
   b) Explain with figure various types of flow patterns. **5**
   c) Explain the need of safety and training in industry. **4**

6. a) Describe different activities at the receiving to improve efficiency of MHS. **5**
   b) Explain with figure From-to chart. **4**
   c) Explain the selection of material handling equipments in foundry. **5**

7. Write short notes on **(any three)** : **14**
   a) Factors affecting on selection of material handling equipments. **5**
   b) Activity relationship chart. **5**
   c) Material handling equation. **5**
   d) General safety regulations for conveyors. **4**

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SLR-VB – 95

Seat No.	

Set S

T.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MATERIAL HANDLING SYSTEM
(Professional Elective – I)

Day and Date : Tuesday, 9-5-2017 Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

***Instructions**: 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct alternative : **14**

1) _____ common fork lift truck accidents are considered in material handling system.
a) Five b) Seven c) One d) Ten

2) Assembly chart show
a) Lay out of the product
b) Sequence in which component are assembled
c) Figure components
d) None of these

3) Equipment evaluation sheet consists of the material characteristics, utilization and
a) Safety b) Vendor characteristics
c) Flexibility d) Unit load

4) Process layout is also known as _____ layout.
a) Line b) Functional c) Fixed d) All of these

5) _____ is the technique used to measure qualitative flow measurement.
a) Activity relationship chart b) Flow process chart
c) From to chart d) None of these

P.T.O.

6) _____ vibrates at a lower frequency and larger amplitude in order to convey larger objects.
   a) Screw conveyors b) Magnetic conveyors
   c) Oscillating conveyors d) None of these

7) The equipment used to move material from one location to another is called as _____ equipment.
   a) Positioning b) Transporting
   c) Storage d) AGV

8) Flat belt conveyor is used for transporting _____ and _____ weight loads.
   a) Heavy and Bulky b) Light and Heavy
   c) Light and Medium d) Medium and Bulky

9) Loads are supported by arms in _____ rack.
   a) Sliding b) Push back
   c) Drive in d) Cantilever

10) As the distance or time factor increases, the cost per unit of product handled
   a) Increases b) Decreases c) Same d) None of these

11) There are three basic characteristics of material handling, picking up the load, transporting the load and
   a) Catching the load b) Rush the load
   c) Setting the load down d) Up the load

12) In AGV systems _____ guide path on the floor used for guidance.
   a) Variable b) Physical c) Circular d) None of these

13) From to chart gives the information about
   a) Density of moves between departments
   b) Equipment
   c) Selection procedure
   d) None of these

14) Symbol “O” represents for
   a) Operation b) Store c) Inspection d) Movement

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SLR-VB – 95

Seat No.	

T.E. (Mech.) (Part – I) (CGPA) Examination, 2017
MATERIAL HANDLING SYSTEM
(Professional Elective – I)

Day and Date : Tuesday, 9-5-2017 Marks : 56
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Draw ***neat*** *diagram* ***where*** *necessary.*
3) Solve ***any two*** *questions in* ***each*** *Section.*

SECTION – I

2. a) Explain principles of material handling system in industry. **5**
   b) Explain any two types of cranes with neat figure. **5**
   c) Explain the concept of unit load. **4**

3. a) What is the meaning of "positioning equipments" ? Explain any two types of positioning equipments with figure. **5**
   b) Explain the need of CIMS in material handling. **5**
   c) Explain any two types of industrial trucks with neat figure. **4**

4. Write a short notes **(any three)** : **14**
   a) Industrial Robot. **5**
   b) Benefits of CIMS over conventional system. **5**
   c) Types of racks. **5**
   d) Conveying equipments. **4**

Set S

SECTION – II

5. a) Explain the general procedure of selection of material handling equipments. **5**
   b) Explain with figure various types of flow patterns. **5**
   c) Explain the need of safety and training in industry. **4**

6. a) Describe different activities at the receiving to improve efficiency of MHS. **5**
   b) Explain with figure From-to chart. **4**
   c) Explain the selection of material handling equipments in foundry. **5**

7. Write short notes on **(any three)** : **14**
   a) Factors affecting on selection of material handling equipments. **5**
   b) Activity relationship chart. **5**
   c) Material handling equation. **5**
   d) General safety regulations for conveyors. **4**

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SLR-VB – 97

Seat No.	

T.E. (Mechanical) (Part – II) (New CGPA) Examination, 2017
METROLOGY AND MECHANICAL MEASUREMENTS

Day and Date : Monday, 15-5-2017 Max. Marks : 70

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt **any two** questions from **each** Section – **I** and Section – **II**.*
*2) Figures to **right** indicate **full** marks.*
*3) Assume **suitable** data if necessary and mention it **clearly**.*
*4) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*5) **Answer MCQ/Objective type questions on Page No. 3 only.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

PART – A

(Objective Type Questions)

Instructions :

I. General :

1) All questions from objective type question paper are compulsory.
2) There is no negative and partial marking system for objective type questions.
3) Instructions for all four types of objective questions are as per the particulars given below.

II. Particulars:

Read the following instructions carefully before you bubble your answer.

1) **Type 1 : Matrix-Match Type.**
All questions are compulsory. There are two questions carrying three marks each. Each question contains statements given in two Columns, which have to be matched. Statements in Column I are labeled as A, B and C, whereas statements in Column II are labeled as p, q, r and s. The statements in Column I may have no match in Column II or may have one or more than one correct matches. The answers to these questions have to be appropriately bubbled as illustrated in the following example ; if the correct matches are A-q, A-r, B-p, B-r, C-p, C-r, C-s.

	p	q	r	s
A	O	●	●	O
B	●	O	●	O
C	●	O	●	●

2) **Type 2 : Assertion and Reasoning Type**. Solve **any one** of the following :
It consists of two statements, one labelled as statements 1 and other labelled as statement 2. Select the answer using the following code :
A) Both statement 1 and statement 2 are true, and statement 2 is the correct explanation of statement 1.
B) Both statement 1 and statement 2 are true but statement 2 is not correct explanation of statement 1.
C) Statement 1 is true, but statement 2 is false.
D) Statement 1 is false, but statement 2 is true.

3) **Type 3 : Multiple Correct Answer Type.**
There are two multiple correct answer type questions. **All** questions are **compulsory**. Each question has four choices (A), (B), (C) and (D), out of which one or more is/are correct. For example, if choices (B) and (C) are correct. Then bubble as below.

A	B	C	D
O	●	●	O

4) **Type 4 : Straight Objective Type :**
There are two questions of this type. **All** are **compulsory**. **Each** question has **four** choices (A), (B), (C) and (D), out of which **only one** is correct. For example, if choice (C) are correct, then bubble as below :

A	B	C	D
O	O	●	O

Objective Type Questions **Marks : 14**

1. **Type 1** : Matrix Match Type : **(3×2=6)**

Sr. No.	Column I	Column II
i)	A) Profile Projector	p) Monochromatic light
	B) Interferometer	q) F.D. is zero
	C) Hole basis	r) Shadow graph
ii)	A) Autocollimator	p) Flow measurement
	B) Hot wire anemometer	q) Acoustic measurement
	C) Seismic instrument	r) Angle displacement
		s) Acceleration measurement

Type 2 : Assertion and reasoning type. **2**

iii) **Statement 1** : Mechanical comparator is sensing device.
Statement 2 : Sigma comparator is a mechanical comparator.

OR

iv) **Statement 1** : Error and uncertainty mean the same thing.
Statement 2 : The random errors are accidental, small and independent.

Type 3 : Multiple correct answer type : **(2×2=4)**

v) Piezoelectric accelerometer consists of
A) Crystal B) Mass C) Spring D) Damper

vi) An end standard or end measuring instrument
A) Has end surfaces as references
B) Has built-in-datum
C) Helps to measure distance between two parallel lines
D) Is not subject to wear

Type 4 : Straight objective type : **(1×2=2)**

vii) Angle gauges can measure minimum angle upto
A) 3″ B) 9″ C) 6″ D) 1″

viii) In a rotameter flow is inferred from
A) Force balance of float B) Direction of flow
C) Colour change D) None of these

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SLR-VB – 97

Seat No.	

T.E. (Mechanical) (Part – II) (New CGPA) Examination, 2017
METROLOGY AND MECHANICAL MEASUREMENTS

Day and Date : Monday, 15-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt **any two** questions from **each** Section – **I** and Section – **II**.*
*2) Figures to **right** indicate **full** marks.*
*3) Assume **suitable** data if necessary and mention it **clearly**.*

PART – B

SECTION – I

2. A) How are the standards of measurement classified ? Describe with help of a sketch the international prototype standard meter. **8**

   B) Distinguish between Line and End standard. **6**

3. A) Determine the tolerances on hole and shaft for precision running fit designated by $40H_7g_6$.40 mm lies in diameter steps 30 – 50. Fundamental deviation of the shaft = $-2.5\ D^{0.34}$. Calculate the actual maximum and minimum sizes of the both hole and shaft and maximum and minimum clearances. **8**

   B) Explain with the help of sketch working of the following device-clinometer or bevel protractor. **6**

4. A) How are effective dia. of screw-thread is measured ? **7**

   B) Describe in brief construction, working and application of sigma mechanical comparator. **7**

SECTION – II

5. A) Define and explain the following terms and characteristics related to measuring system (**any three**) :
   i) Sensitivity
   ii) Fiedlity and dynamic error
   iii) Threshold and resolution
   iv) Hysteresis. **9**

   B) Explain the working of diaphragm gauge with sketch. State the expression for pressure. **5**

6. A) Enumerate various types of mechanical transducers using elastic member for sensing and explain working of any one. **7**

   B) Explain the working of LVDT with neat sketch. **7**

7. A) Explain the working of Wheatstones bridge circuit (deflection mode). Derive the expression for output and prove that the output doubles in case of half bridge as compared to quarter bridge. **9**

   B) Explain the working of **any one** of the following : **5**
   i) Turbine meter
   ii) Hot wire anemometer.

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SLR-VB – 98

Seat No.	

Set **P**

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Wednesday, 17-5-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) **Assume** suitable data **if necessary**.*
*3) **Use** of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) In IC Engine camshaft controls
   a) Valve opening b) Valve closing
   c) Valve timing d) All the above

2) In simple elementary carburettor constant height of petrol in a float chamber is maintained by
   a) Throttle valve b) Float and needle valve
   c) Strainer d) None of the above

3) The working cycle in case of four stroke engine is completed in following number of revolutions of crankshaft.
   a) 1/2 b) 1 c) 2 d) 5

4) Air Fuel ratio is least in
   a) Idling range b) Acceleration
   c) Cruising range d) High power range

5) In fuel injector fuel injection pressure is adjusted on
   a) Locking nut b) Adjusting screw
   c) Spindle d) None of the above

P.T.O.

6) Commonly used injection system in automobile is
   a) Air injection
   b) Solid injection
   c) Combination of a) and b)
   d) None of the above

7) Dry sump lubrication system is used in
   a) Modern cars
   b) Racing cars
   c) German cars
   d) Tata cars

8) The purpose of the thermostat is to keep the engine
   a) Hot
   b) Cool
   c) At desired temperature
   d) None of the above

9) Knocking take place in CI engines
   a) At the start of combustion
   b) At the end of combustion
   c) During combustion
   d) None of the above

10) An effective method of prevention of detonation in SI engine is the
   a) Cooling of the charge
   b) Heating of the charge
   c) Locating spark plug at one end of combustion chamber
   d) None of the above

11) Indicated mean effective pressure in an engine depends upon its
   a) Speed only
   b) Speed and power
   c) Speed and torque
   d) Torque only

12) Indicated power is directly proportional to
   a) Speed
   b) Air consumption
   c) Cylinder peak pressure
   d) All of the above

13) Octane number of iso-octane is
   a) 0 b) 30 c) 60 d) 100

14) Supercharging increases the power output of the engine by
   a) Increasing the charge temperature
   b) Increasing the charge pressure
   c) Increasing the speed of the engine
   d) None of above

SLR-VB – 98

Seat No.	

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Wednesday, 17-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) **Assume** suitable data **if necessary**.*
*3) **Use** of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Discuss the following losses which occur in an actual engine. **6**
   I) Exhaust blow down losses
   II) Pumping losses
   III) Time losses.

   b) Compare Diesel Cycle with Otto cycle with neat PV diagrams of each. **4**

   c) Enlist and explain assumption made for fuel-air cycle analysis. **4**

3. a) Derive an equation for air-fuel ratio for carburetor by approximate method. **6**

   b) Enlist the additional systems added in a simple carburetor to make it a complete carburetor. Give the reasons why each system is required. **4**

   c) What are the different types of ignition systems used in engines. With a neat sketch explain battery ignition system. **4**

4. a) A six cylinder, 4-stroke oil engine develops 200 kW at 1200 RPM and consumes 0.3 kg/k Wh. Determine the diameter of a single orifice injector, if the injection pressure is 200 bar and combustion chamber pressure is 40 bar. The injection is carried out for 30 degrees of crank rotation. Take density of fuel as 900 kg/m^3 and Cdf = 0.7. **6**

   b) Discuss atomization and spray formation in C.I. Engines. **4**

   c) Classify lubrication system used in I.C. Engines. Explain pressure lubrication with figure. **4**

SECTION – II

5. a) Explain statement “Good CI engine fuel is bad SI engine fuel”. **4**

   b) What are the basic requirements of good combustion chamber ? **4**

   c) Explain stages of combustion in CI engine. **6**

6. a) A single cylinder 4 stroke cycle oil engine works on diesel cycle.The following reading were taken when the engine was running at full load –
   Indicated mean effective pressure = 7.5 bar
   Speed of engine = 400 rpm
   Load on the brake = 380 N
   Diameter of the brake drum = 120 cm
   Fuel consumption = 2.8 kg/hr
   Calorific value of fuel = 42000 kJ/kg
   Diameter of cylinder = 16 cm
   Stroke of piston = 20 cm
   Find :
   1) Friction power of the engine
   2) Mechanical efficiency
   3) Brake thermal efficiency
   4) Brake mean effective pressure
   5) Indicated mean effective pressure. **10**

   b) Explain Morse test of internal combustion engine. **4**

7. a) Explain highest useful compression ratio. **4**

   b) Write note on Octane number. **4**

   c) Explain exhaust gas recirculation method used for pollution control. **6**

SLR-VB – 98

Seat No.	

Set Q

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Wednesday, 17-5-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) **Assume** suitable data **if necessary**.*
*3) **Use** of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) The purpose of the thermostat is to keep the engine
   a) Hot b) Cool
   c) At desired temperature d) None of the above

2) Knocking take place in CI engines
   a) At the start of combustion b) At the end of combustion
   c) During combustion d) None of the above

3) An effective method of prevention of detonation in SI engine is the
   a) Cooling of the charge
   b) Heating of the charge
   c) Locating spark plug at one end of combustion chamber
   d) None of the above

4) Indicated mean effective pressure in an engine depends upon its
   a) Speed only b) Speed and power
   c) Speed and torque d) Torque only

P.T.O.

5) Indicated power is directly proportional to
   a) Speed b) Air consumption
   c) Cylinder peak pressure d) All of the above

6) Octane number of iso-octane is
   a) 0 b) 30 c) 60 d) 100

7) Supercharging increases the power output of the engine by
   a) Increasing the charge temperature
   b) Increasing the charge pressure
   c) Increasing the speed of the engine
   d) None of above

8) In IC Engine camshaft controls
   a) Valve opening b) Valve closing
   c) Valve timing d) All the above

9) In simple elementary carburettor constant height of petrol in a float chamber is maintained by
   a) Throttle valve b) Float and needle valve
   c) Strainer d) None of the above

10) The working cycle in case of four stroke engine is completed in following number of revolutions of crankshaft.
   a) 1/2 b) 1 c) 2 d) 5

11) Air Fuel ratio is least in
   a) Idling range b) Acceleration
   c) Cruising range d) High power range

12) In fuel injector fuel injection pressure is adjusted on
   a) Locking nut b) Adjusting screw
   c) Spindle d) None of the above

13) Commonly used injection system in automobile is
   a) Air injection b) Solid injection
   c) Combination of a) and b) d) None of the above

14) Dry sump lubrication system is used in
   a) Modern cars b) Racing cars
   c) German cars d) Tata cars

SLR-VB – 98

Seat No.	

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Wednesday, 17-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) **Assume** suitable data **if necessary**.*
*3) **Use** of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Discuss the following losses which occur in an actual engine. **6**
   I) Exhaust blow down losses
   II) Pumping losses
   III) Time losses.

   b) Compare Diesel Cycle with Otto cycle with neat PV diagrams of each. **4**

   c) Enlist and explain assumption made for fuel-air cycle analysis. **4**

3. a) Derive an equation for air-fuel ratio for carburetor by approximate method. **6**

   b) Enlist the additional systems added in a simple carburetor to make it a complete carburetor. Give the reasons why each system is required. **4**

   c) What are the different types of ignition systems used in engines. With a neat sketch explain battery ignition system. **4**

4. a) A six cylinder, 4-stroke oil engine develops 200 kW at 1200 RPM and consumes 0.3 kg/k Wh. Determine the diameter of a single orifice injector, if the injection pressure is 200 bar and combustion chamber pressure is 40 bar. The injection is carried out for 30 degrees of crank rotation. Take density of fuel as 900 kg/m^3 and Cdf = 0.7. **6**

   b) Discuss atomization and spray formation in C.I. Engines. **4**

   c) Classify lubrication system used in I.C. Engines. Explain pressure lubrication with figure. **4**

SECTION – II

5. a) Explain statement “Good CI engine fuel is bad SI engine fuel”. **4**

   b) What are the basic requirements of good combustion chamber ? **4**

   c) Explain stages of combustion in CI engine. **6**

6. a) A single cylinder 4 stroke cycle oil engine works on diesel cycle.The following reading were taken when the engine was running at full load –
   Indicated mean effective pressure = 7.5 bar
   Speed of engine = 400 rpm
   Load on the brake = 380 N
   Diameter of the brake drum = 120 cm
   Fuel consumption = 2.8 kg/hr
   Calorific value of fuel = 42000 kJ/kg
   Diameter of cylinder = 16 cm
   Stroke of piston = 20 cm
   Find :
   1) Friction power of the engine
   2) Mechanical efficiency
   3) Brake thermal efficiency
   4) Brake mean effective pressure
   5) Indicated mean effective pressure. **10**

   b) Explain Morse test of internal combustion engine. **4**

7. a) Explain highest useful compression ratio. **4**

   b) Write note on Octane number. **4**

   c) Explain exhaust gas recirculation method used for pollution control. **6**

SLR-VB – 98

Seat No.	

Set **R**

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Wednesday, 17-5-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) **Assume** suitable data **if necessary**.*
*3) **Use** of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) In fuel injector fuel injection pressure is adjusted on
   a) Locking nut b) Adjusting screw
   c) Spindle d) None of the above

2) Commonly used injection system in automobile is
   a) Air injection b) Solid injection
   c) Combination of a) and b) d) None of the above

3) Dry sump lubrication system is used in
   a) Modern cars b) Racing cars
   c) German cars d) Tata cars

4) The purpose of the thermostat is to keep the engine
   a) Hot b) Cool
   c) At desired temperature d) None of the above

5) Knocking take place in CI engines
   a) At the start of combustion b) At the end of combustion
   c) During combustion d) None of the above

P.T.O.

6) An effective method of prevention of detonation in SI engine is the
   a) Cooling of the charge
   b) Heating of the charge
   c) Locating spark plug at one end of combustion chamber
   d) None of the above

7) Indicated mean effective pressure in an engine depends upon its
   a) Speed only
   b) Speed and power
   c) Speed and torque
   d) Torque only

8) Indicated power is directly proportional to
   a) Speed
   b) Air consumption
   c) Cylinder peak pressure
   d) All of the above

9) Octane number of iso-octane is
   a) 0 b) 30 c) 60 d) 100

10) Supercharging increases the power output of the engine by
   a) Increasing the charge temperature
   b) Increasing the charge pressure
   c) Increasing the speed of the engine
   d) None of above

11) In IC Engine camshaft controls
   a) Valve opening
   b) Valve closing
   c) Valve timing
   d) All the above

12) In simple elementary carburettor constant height of petrol in a float chamber is maintained by
   a) Throttle valve
   b) Float and needle valve
   c) Strainer
   d) None of the above

13) The working cycle in case of four stroke engine is completed in following number of revolutions of crankshaft.
   a) 1/2 b) 1 c) 2 d) 5

14) Air Fuel ratio is least in
   a) Idling range
   b) Acceleration
   c) Cruising range
   d) High power range

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Seat No.	

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Wednesday, 17-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) **Assume** suitable data **if necessary**.*
*3) **Use** of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Discuss the following losses which occur in an actual engine. **6**
   I) Exhaust blow down losses
   II) Pumping losses
   III) Time losses.

   b) Compare Diesel Cycle with Otto cycle with neat PV diagrams of each. **4**

   c) Enlist and explain assumption made for fuel-air cycle analysis. **4**

3. a) Derive an equation for air-fuel ratio for carburetor by approximate method. **6**

   b) Enlist the additional systems added in a simple carburetor to make it a complete carburetor. Give the reasons why each system is required. **4**

   c) What are the different types of ignition systems used in engines. With a neat sketch explain battery ignition system. **4**

4. a) A six cylinder, 4-stroke oil engine develops 200 kW at 1200 RPM and consumes 0.3 kg/k Wh. Determine the diameter of a single orifice injector, if the injection pressure is 200 bar and combustion chamber pressure is 40 bar. The injection is carried out for 30 degrees of crank rotation. Take density of fuel as 900 kg/m^3 and Cdf = 0.7. **6**

   b) Discuss atomization and spray formation in C.I. Engines. **4**

   c) Classify lubrication system used in I.C. Engines. Explain pressure lubrication with figure. **4**

SECTION – II

5. a) Explain statement “Good CI engine fuel is bad SI engine fuel”. **4**

   b) What are the basic requirements of good combustion chamber ? **4**

   c) Explain stages of combustion in CI engine. **6**

6. a) A single cylinder 4 stroke cycle oil engine works on diesel cycle.The following reading were taken when the engine was running at full load –
   Indicated mean effective pressure = 7.5 bar
   Speed of engine = 400 rpm
   Load on the brake = 380 N
   Diameter of the brake drum = 120 cm
   Fuel consumption = 2.8 kg/hr
   Calorific value of fuel = 42000 kJ/kg
   Diameter of cylinder = 16 cm
   Stroke of piston = 20 cm
   Find :
   1) Friction power of the engine
   2) Mechanical efficiency
   3) Brake thermal efficiency
   4) Brake mean effective pressure
   5) Indicated mean effective pressure. **10**

   b) Explain Morse test of internal combustion engine. **4**

7. a) Explain highest useful compression ratio. **4**

   b) Write note on Octane number. **4**

   c) Explain exhaust gas recirculation method used for pollution control. **6**

SLR-VB – 98

Seat No.	

Set S

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Wednesday, 17-5-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) **Assume** suitable data **if necessary**.*
*3) **Use** of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **14**

1) An effective method of prevention of detonation in SI engine is the
   a) Cooling of the charge
   b) Heating of the charge
   c) Locating spark plug at one end of combustion chamber
   d) None of the above

2) Indicated mean effective pressure in an engine depends upon its
   a) Speed only b) Speed and power
   c) Speed and torque d) Torque only

3) Indicated power is directly proportional to
   a) Speed b) Air consumption
   c) Cylinder peak pressure d) All of the above

4) Octane number of iso-octane is
   a) 0 b) 30 c) 60 d) 100

P.T.O.

5) Supercharging increases the power output of the engine by
   a) Increasing the charge temperature
   b) Increasing the charge pressure
   c) Increasing the speed of the engine
   d) None of above

6) In IC Engine camshaft controls
   a) Valve opening b) Valve closing
   c) Valve timing d) All the above

7) In simple elementary carburettor constant height of petrol in a float chamber is maintained by
   a) Throttle valve b) Float and needle valve
   c) Strainer d) None of the above

8) The working cycle in case of four stroke engine is completed in following number of revolutions of crankshaft.
   a) 1/2 b) 1 c) 2 d) 5

9) Air Fuel ratio is least in
   a) Idling range b) Acceleration
   c) Cruising range d) High power range

10) In fuel injector fuel injection pressure is adjusted on
   a) Locking nut b) Adjusting screw
   c) Spindle d) None of the above

11) Commonly used injection system in automobile is
   a) Air injection b) Solid injection
   c) Combination of a) and b) d) None of the above

12) Dry sump lubrication system is used in
   a) Modern cars b) Racing cars
   c) German cars d) Tata cars

13) The purpose of the thermostat is to keep the engine
   a) Hot b) Cool
   c) At desired temperature d) None of the above

14) Knocking take place in CI engines
   a) At the start of combustion b) At the end of combustion
   c) During combustion d) None of the above

SLR-VB – 98

Seat No.	

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Wednesday, 17-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) **Assume** suitable data **if necessary**.*
*3) **Use** of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Discuss the following losses which occur in an actual engine. **6**
   I) Exhaust blow down losses
   II) Pumping losses
   III) Time losses.

   b) Compare Diesel Cycle with Otto cycle with neat PV diagrams of each. **4**

   c) Enlist and explain assumption made for fuel-air cycle analysis. **4**

3. a) Derive an equation for air-fuel ratio for carburetor by approximate method. **6**

   b) Enlist the additional systems added in a simple carburetor to make it a complete carburetor. Give the reasons why each system is required. **4**

   c) What are the different types of ignition systems used in engines. With a neat sketch explain battery ignition system. **4**

4. a) A six cylinder, 4-stroke oil engine develops 200 kW at 1200 RPM and consumes 0.3 kg/k Wh. Determine the diameter of a single orifice injector, if the injection pressure is 200 bar and combustion chamber pressure is 40 bar. The injection is carried out for 30 degrees of crank rotation. Take density of fuel as 900 kg/m^3 and Cdf = 0.7. **6**

   b) Discuss atomization and spray formation in C.I. Engines. **4**

   c) Classify lubrication system used in I.C. Engines. Explain pressure lubrication with figure. **4**

SECTION – II

5. a) Explain statement “Good CI engine fuel is bad SI engine fuel”. **4**

   b) What are the basic requirements of good combustion chamber ? **4**

   c) Explain stages of combustion in CI engine. **6**

6. a) A single cylinder 4 stroke cycle oil engine works on diesel cycle.The following reading were taken when the engine was running at full load –
   Indicated mean effective pressure = 7.5 bar
   Speed of engine = 400 rpm
   Load on the brake = 380 N
   Diameter of the brake drum = 120 cm
   Fuel consumption = 2.8 kg/hr
   Calorific value of fuel = 42000 kJ/kg
   Diameter of cylinder = 16 cm
   Stroke of piston = 20 cm
   Find :
   1) Friction power of the engine
   2) Mechanical efficiency
   3) Brake thermal efficiency
   4) Brake mean effective pressure
   5) Indicated mean effective pressure. **10**

   b) Explain Morse test of internal combustion engine. **4**

7. a) Explain highest useful compression ratio. **4**

   b) Write note on Octane number. **4**

   c) Explain exhaust gas recirculation method used for pollution control. **6**

SLR-VB – 99

Seat No.	

Set P

T.E. (Mechanical) (Part – II) (New-CGPA) Examination, 2017
CAD/CAM

Day and Date : Friday, 19-5-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Assume suitable data **if required** and mention **clearly**.*
*4) **Use** of non-programmable scientific calculator is **allowed**.*
*5) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Combination of more than one geometric transformation at a time in computer graphics is called as
   a) Double Transformations b) Multiple transformations
   c) Concatenation d) None of these

2) Geometric modeling corresponds to
   a) Synthesis phase of CAD
   b) Analysis phase of CAD
   c) Synthesis and analysis phase of CAD
   d) None of the above

3) 'Retrieval type' and 'generative type' are the types of
   a) CAPP b) GT
   c) FMS d) CNC programming

4) Which of the following is the rapid prototyping method ?
   a) Stereo lithography b) Selective Laser Sintering
   c) Fused Deposition Modeling d) All of these

P.T.O.

5) In the following geometric modeling which is not 3D modeling ?
   a) Wireframe modeling b) Drafting
   c) Surface modeling d) Solid Modeling

6) G90 preparatory code is used for
   a) Absolute presetting b) Absolute programming
   c) Incremental programming d) Metric unit setting

7) _____ is the type of graphics standards.
   a) PHIGS b) CORE
   c) GKS d) All of these

8) Tool and fixture design is a task under
   a) CAD b) CAM
   c) CAE d) None of these

9) DC Servo motors are used as drive motors in
   a) Open loop control b) Close loop control
   c) Both a) and b) d) None of the above

10) In CNC systems, Non-Value-adding time is _____
   a) Reduced considerably b) Increased considerably
   c) Not affected at all d) Depends totally on operator

11) In numerical control systems, DNC stands for
   a) Dedicated Numerical Control b) Directional Numerical Control
   c) Distributed Numerical Control d) None of these

12) NC machines used for drilling, boring, reaming, tapping is
   a) Contouring type b) Straight cut
   c) Point-to-point d) None of the above

13) Which type of tool magazines are generally used to handle around 200 tools in CNC machines ?
   a) Drum type b) Chain type
   c) Turret type d) Both a) and b)

14) The preparatory function used for circular clockwise interpolation function is
   a) G03 b) G02
   c) G04 d) G01

_____

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Seat No.	

T.E. (Mechanical) (Part – II) (New-CGPA) Examination, 2017
CAD/CAM

Day and Date : Friday, 19-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Assume suitable data* ***if required*** *and mention clearly.*
2) ***Use*** *of non-programmable scientific calculator is allowed.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Solve ***any two*** *questions from Q. No.* ***2*** *to Q. No.* ***4****.*
5) Question No. ***5*** *is* ***compulsory****.*
6) Solve ***any one*** *question from Q. No.* ***6*** *and Q. No.* ***7****.*

SECTION – I

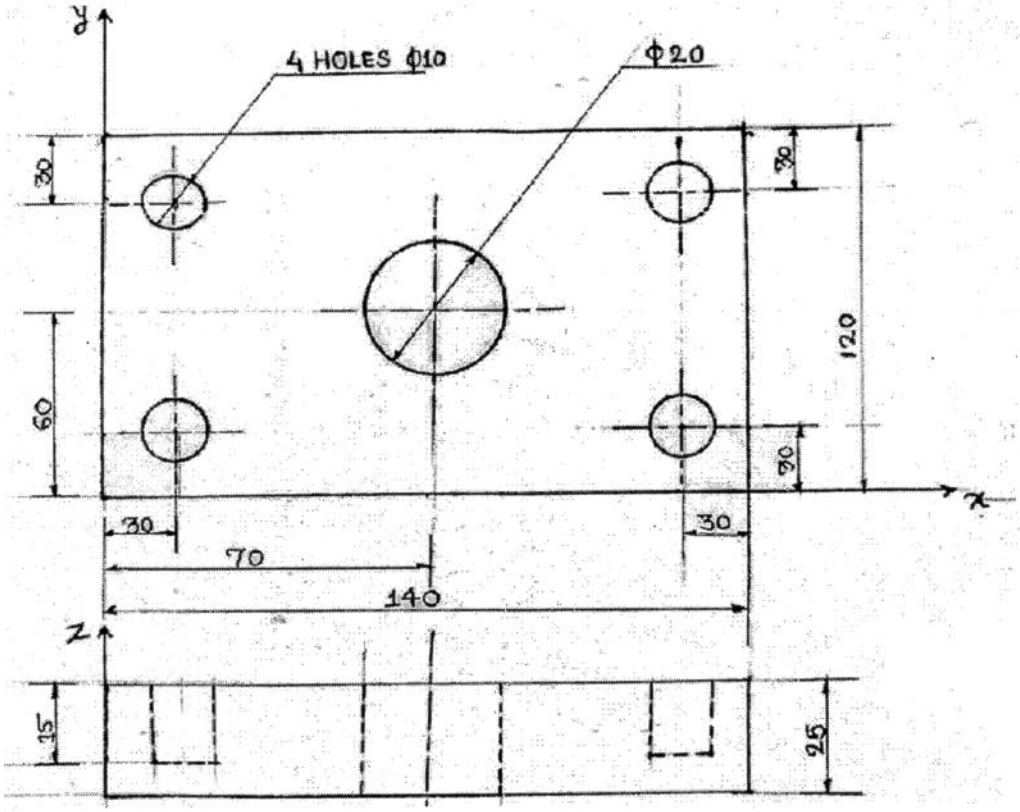
2. a) What is CAD/CAM ? Discuss its role in product cycle. **7**
   b) Discuss the importance of part family in group technology with example. **7**

3. a) Elaborate the significance of Homogeneous co-ordinates in Computer Graphics. **7**
   b) Explain CSG and Boolean operations with their importance in solid Modeling. **7**

4. Write notes on **any 3** : **14**
   a) B-spline curve
   b) Materials Requirement Planning
   c) Integration of CAD and CAM
   d) Geometric transformations in CAD.

SECTION – II

5. a) Write a CNC part program for following component and explain. State your assumptions clearly and draw setup figure. Mention tools used and operation sequence.
Work material : Mild steel, Tool materials : HSS **10**



b) Discuss in brief, preparatory codes in CNC programming. **4**

6. a) Elaborate types of tool magazine in CNC with neat sketch. **7**

b) What is adaptive control ? Discuss in detail. **7**

7. Write notes on **any 3** : **14**

a) Importance of pallets in CNC

b) Structure and components of CNC lathe

c) Distributed Numerical Control

d) Tape formats in NC.

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Seat No.	

Set Q

T.E. (Mechanical) (Part – II) (New-CGPA) Examination, 2017
CAD/CAM

Day and Date : Friday, 19-5-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Assume suitable data **if required** and mention **clearly**.*
*4) **Use** of non-programmable scientific calculator is **allowed**.*
*5) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) Tool and fixture design is a task under
   a) CAD b) CAM
   c) CAE d) None of these

2) DC Servo motors are used as drive motors in
   a) Open loop control b) Close loop control
   c) Both a) and b) d) None of the above

3) In CNC systems, Non-Value-adding time is _____
   a) Reduced considerably b) Increased considerably
   c) Not affected at all d) Depends totally on operator

4) In numerical control systems, DNC stands for
   a) Dedicated Numerical Control b) Directional Numerical Control
   c) Distributed Numerical Control d) None of these

5) NC machines used for drilling, boring, reaming, tapping is
   a) Contouring type b) Straight cut
   c) Point-to-point d) None of the above

P.T.O.

6) Which type of tool magazines are generally used to handle around 200 tools in CNC machines ?
   a) Drum type
   b) Chain type
   c) Turret type
   d) Both a) and b)

7) The preparatory function used for circular clockwise interpolation function is
   a) G03
   b) G02
   c) G04
   d) G01

8) Combination of more than one geometric transformation at a time in computer graphics is called as
   a) Double Transformations
   b) Multiple transformations
   c) Concatenation
   d) None of these

9) Geometric modeling corresponds to
   a) Synthesis phase of CAD
   b) Analysis phase of CAD
   c) Synthesis and analysis phase of CAD
   d) None of the above

10) 'Retrieval type' and 'generative type' are the types of
   a) CAPP
   b) GT
   c) FMS
   d) CNC programming

11) Which of the following is the rapid prototyping method ?
   a) Stereo lithography
   b) Selective Laser Sintering
   c) Fused Deposition Modeling
   d) All of these

12) In the following geometric modeling which is not 3D modeling ?
   a) Wireframe modeling
   b) Drafting
   c) Surface modeling
   d) Solid Modeling

13) G90 preparatory code is used for
   a) Absolute presetting
   b) Absolute programming
   c) Incremental programming
   d) Metric unit setting

14) _____ is the type of graphics standards.
   a) PHIGS
   b) CORE
   c) GKS
   d) All of these

SLR-VB – 99

Seat No.	

T.E. (Mechanical) (Part – II) (New-CGPA) Examination, 2017
CAD/CAM

Day and Date : Friday, 19-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Assume suitable data* ***if required*** *and mention clearly.*
2) ***Use*** *of non-programmable scientific calculator is allowed.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Solve ***any two*** *questions from Q. No.* ***2*** *to Q. No.* ***4****.*
5) Question No. ***5*** *is* ***compulsory****.*
6) Solve ***any one*** *question from Q. No.* ***6*** *and Q. No.* ***7****.*

SECTION – I

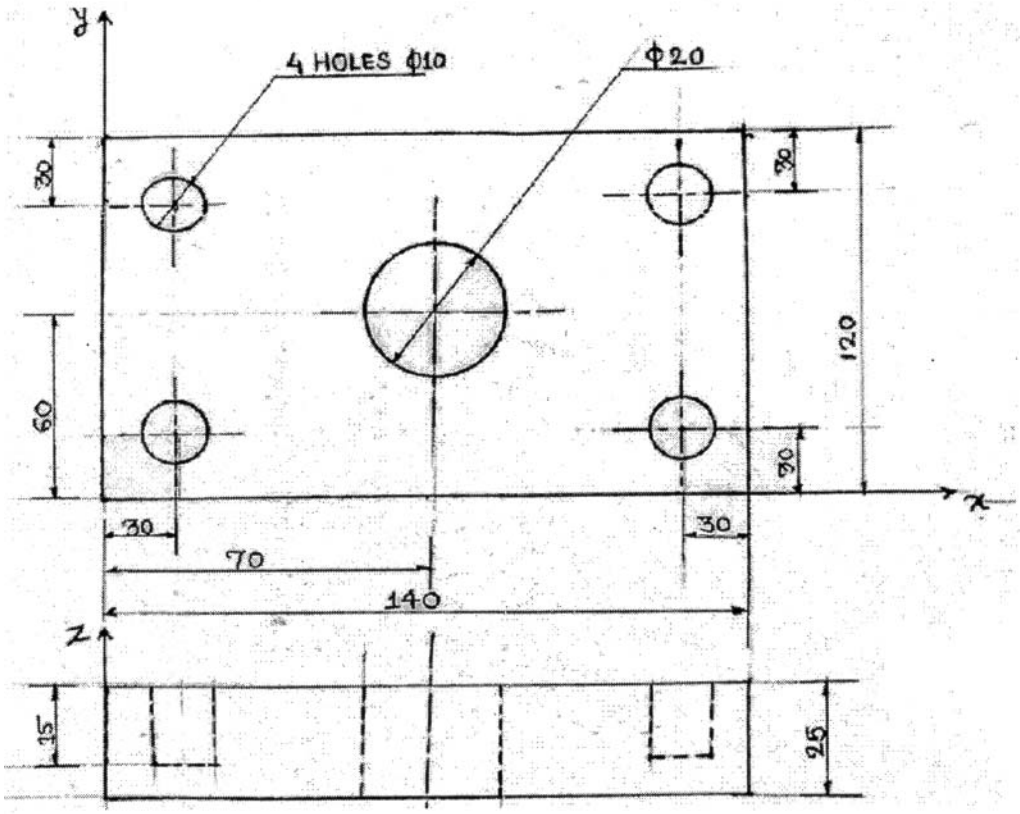
2. a) What is CAD/CAM ? Discuss its role in product cycle. **7**
   b) Discuss the importance of part family in group technology with example. **7**

3. a) Elaborate the significance of Homogeneous co-ordinates in Computer Graphics. **7**
   b) Explain CSG and Boolean operations with their importance in solid Modeling. **7**

4. Write notes on **any 3** : **14**
   a) B-spline curve
   b) Materials Requirement Planning
   c) Integration of CAD and CAM
   d) Geometric transformations in CAD.

SECTION – II

5. a) Write a CNC part program for following component and explain. State your assumptions clearly and draw setup figure. Mention tools used and operation sequence.
Work material : Mild steel, Tool materials : HSS **10**



b) Discuss in brief, preparatory codes in CNC programming. **4**

6. a) Elaborate types of tool magazine in CNC with neat sketch. **7**

b) What is adaptive control ? Discuss in detail. **7**

7. Write notes on **any 3** : **14**

a) Importance of pallets in CNC

b) Structure and components of CNC lathe

c) Distributed Numerical Control

d) Tape formats in NC.

SLR-VB – 99

Seat No.	

Set R

T.E. (Mechanical) (Part – II) (New-CGPA) Examination, 2017
CAD/CAM

Day and Date : Friday, 19-5-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Assume suitable data **if required** and mention **clearly**.*
*4) **Use** of non-programmable scientific calculator is **allowed**.*
*5) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) In the following geometric modeling which is not 3D modeling ?
   a) Wireframe modeling b) Drafting
   c) Surface modeling d) Solid Modeling

2) G90 preparatory code is used for
   a) Absolute presetting b) Absolute programming
   c) Incremental programming d) Metric unit setting

3) _____ is the type of graphics standards.
   a) PHIGS b) CORE
   c) GKS d) All of these

4) Tool and fixture design is a task under
   a) CAD b) CAM
   c) CAE d) None of these

5) DC Servo motors are used as drive motors in
   a) Open loop control b) Close loop control
   c) Both a) and b) d) None of the above

P.T.O.

6) In CNC systems, Non-Value-adding time is _____
   a) Reduced considerably
   b) Increased considerably
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   d) Depends totally on operator

7) In numerical control systems, DNC stands for
   a) Dedicated Numerical Control
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   c) Distributed Numerical Control
   d) None of these

8) NC machines used for drilling, boring, reaming, tapping is
   a) Contouring type
   b) Straight cut
   c) Point-to-point
   d) None of the above

9) Which type of tool magazines are generally used to handle around 200 tools in CNC machines ?
   a) Drum type
   b) Chain type
   c) Turret type
   d) Both a) and b)

10) The preparatory function used for circular clockwise interpolation function is
   a) G03
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13) 'Retrieval type' and 'generative type' are the types of
   a) CAPP
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   c) FMS
   d) CNC programming

14) Which of the following is the rapid prototyping method ?
   a) Stereo lithography
   b) Selective Laser Sintering
   c) Fused Deposition Modeling
   d) All of these

SLR-VB – 99

Seat No.	

T.E. (Mechanical) (Part – II) (New-CGPA) Examination, 2017
CAD/CAM

Day and Date : Friday, 19-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Assume suitable data* ***if required*** *and mention clearly.*
2) ***Use*** *of non-programmable scientific calculator is allowed.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Solve ***any two*** *questions from Q. No.* ***2*** *to Q. No.* ***4****.*
5) Question No. ***5*** *is* ***compulsory****.*
6) Solve ***any one*** *question from Q. No.* ***6*** *and Q. No.* ***7****.*

SECTION – I

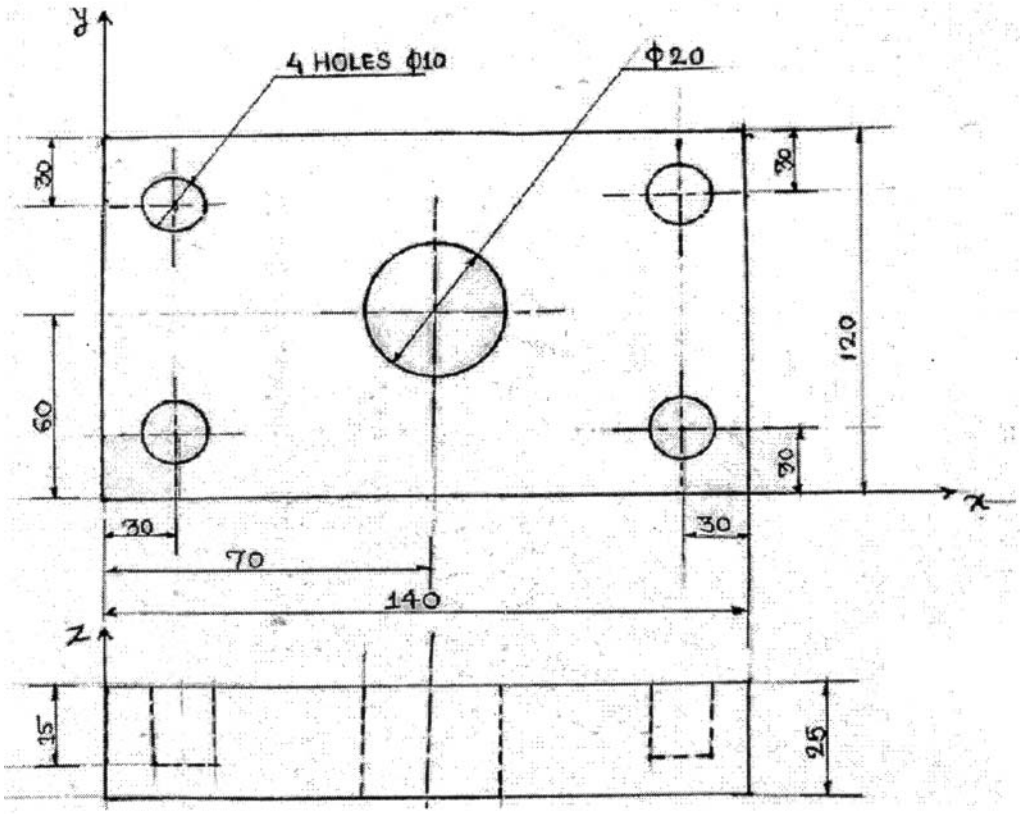
2. a) What is CAD/CAM ? Discuss its role in product cycle. **7**
   b) Discuss the importance of part family in group technology with example. **7**

3. a) Elaborate the significance of Homogeneous co-ordinates in Computer Graphics. **7**
   b) Explain CSG and Boolean operations with their importance in solid Modeling. **7**

4. Write notes on **any 3** : **14**
   a) B-spline curve
   b) Materials Requirement Planning
   c) Integration of CAD and CAM
   d) Geometric transformations in CAD.

SECTION – II

5. a) Write a CNC part program for following component and explain. State your assumptions clearly and draw setup figure. Mention tools used and operation sequence.
Work material : Mild steel, Tool materials : HSS **10**



b) Discuss in brief, preparatory codes in CNC programming. **4**

6. a) Elaborate types of tool magazine in CNC with neat sketch. **7**

b) What is adaptive control ? Discuss in detail. **7**

7. Write notes on **any 3** : **14**

a) Importance of pallets in CNC

b) Structure and components of CNC lathe

c) Distributed Numerical Control

d) Tape formats in NC.

SLR-VB – 99

Seat No.	

Set S

T.E. (Mechanical) (Part – II) (New-CGPA) Examination, 2017
CAD/CAM

Day and Date : Friday, 19-5-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Assume suitable data **if required** and mention **clearly**.*
*4) **Use** of non-programmable scientific calculator is **allowed**.*
*5) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer : **(14×1=14)**

1) In CNC systems, Non-Value-adding time is _____
   a) Reduced considerably b) Increased considerably
   c) Not affected at all d) Depends totally on operator

2) In numerical control systems, DNC stands for
   a) Dedicated Numerical Control b) Directional Numerical Control
   c) Distributed Numerical Control d) None of these

3) NC machines used for drilling, boring, reaming, tapping is
   a) Contouring type b) Straight cut
   c) Point-to-point d) None of the above

4) Which type of tool magazines are generally used to handle around 200 tools in CNC machines ?
   a) Drum type b) Chain type
   c) Turret type d) Both a) and b)

P.T.O.

5) The preparatory function used for circular clockwise interpolation function is
   a) G03 b) G02
   c) G04 d) G01

6) Combination of more than one geometric transformation at a time in computer graphics is called as
   a) Double Transformations b) Multiple transformations
   c) Concatenation d) None of these

7) Geometric modeling corresponds to
   a) Synthesis phase of CAD
   b) Analysis phase of CAD
   c) Synthesis and analysis phase of CAD
   d) None of the above

8) 'Retrieval type' and 'generative type' are the types of
   a) CAPP b) GT
   c) FMS d) CNC programming

9) Which of the following is the rapid prototyping method ?
   a) Stereo lithography b) Selective Laser Sintering
   c) Fused Deposition Modeling d) All of these

10) In the following geometric modeling which is not 3D modeling ?
   a) Wireframe modeling b) Drafting
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12) _____ is the type of graphics standards.
   a) PHIGS b) CORE
   c) GKS d) All of these

13) Tool and fixture design is a task under
   a) CAD b) CAM
   c) CAE d) None of these

14) DC Servo motors are used as drive motors in
   a) Open loop control b) Close loop control
   c) Both a) and b) d) None of the above

_____

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Seat No.	

T.E. (Mechanical) (Part – II) (New-CGPA) Examination, 2017
CAD/CAM

Day and Date : Friday, 19-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Assume suitable data* ***if required*** *and mention clearly.*
2) ***Use*** *of non-programmable scientific calculator is allowed.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Solve ***any two*** *questions from Q. No.* ***2*** *to Q. No.* ***4****.*
5) Question No. ***5*** *is* ***compulsory****.*
6) Solve ***any one*** *question from Q. No.* ***6*** *and Q. No.* ***7****.*

SECTION – I

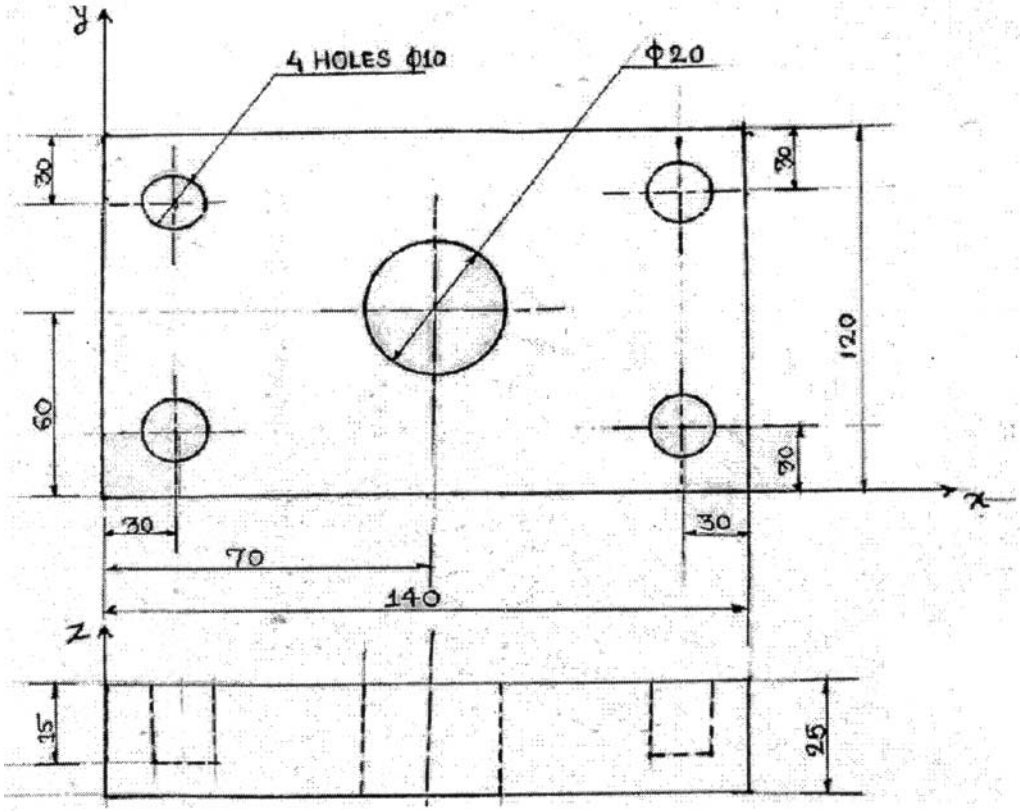
2. a) What is CAD/CAM ? Discuss its role in product cycle. **7**
   b) Discuss the importance of part family in group technology with example. **7**

3. a) Elaborate the significance of Homogeneous co-ordinates in Computer Graphics. **7**
   b) Explain CSG and Boolean operations with their importance in solid Modeling. **7**

4. Write notes on **any 3** : **14**
   a) B-spline curve
   b) Materials Requirement Planning
   c) Integration of CAD and CAM
   d) Geometric transformations in CAD.

SECTION – II

5. a) Write a CNC part program for following component and explain. State your assumptions clearly and draw setup figure. Mention tools used and operation sequence.
Work material : Mild steel, Tool materials : HSS **10**



b) Discuss in brief, preparatory codes in CNC programming. **4**

6. a) Elaborate types of tool magazine in CNC with neat sketch. **7**

b) What is adaptive control ? Discuss in detail. **7**

7. Write notes on **any 3** : **14**

a) Importance of pallets in CNC

b) Structure and components of CNC lathe

c) Distributed Numerical Control

d) Tape formats in NC.

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Seat No.	

Set P

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
MACHINE DESIGN – II

Day and Date : Monday, 22-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data if necessary and mention it ***clearly****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. I) Multiple correct answer type questions, carrying **two** marks **each**. **8**

A) For pressure vessel made of ductile materials, which of the following equations are suitable ?
a) Lame's equation
b) Clavarino's equation
c) Reynold's equation
d) Birnie's equation

B) Which of the following gear ratios does not require hunting tooth ?
a) 54 : 27 b) 44 : 22
c) 51 : 25 d) 61 : 20

C) Which of the following bearings can take load in both radial and axial direction ?
a) Angular Contact Bearing
b) Spherical Roller Bearing
c) Cylindrical Roller Bearing
d) Thrust Ball Bearing

D) Design equations used in the Johnson's method of optimum design are
a) Primary design equation
b) Normal equation
c) Redundant equation
d) Limit equation

II) Single correct answer type questions, carrying **one** marks **each**. **6**

A) The minimum number of teeth on the pinion to operate without interference in standard full height involute teeth gear mechanism with 20° pressure angle is

a) 14 b) 12
c) 18 d) 32

B) Maximum stress induced in spherical pressure vessel is _____ for the same pressure and diameter.

a) Half of that in cylindrical pressure vessel
b) Double of that in cylindrical pressure vessel
c) Equal to that in cylindrical pressure vessel
d) None of the above

C) Boundary lubricated bearing is

a) Thick film bearing b) Thin film bearing
c) Hydrodynamic bearing d) Hydrostatic bearing

D) The number of grades used to specify the quality of gears is

a) 10 b) 11
c) 12 d) 13

E) Lewis equation in spur gears is used to find the

a) Tensile stress b) Bending stress
c) Shear stress d) Fatigue stress

F) Static force on gear tooth is due to

a) Power transmitted by gears
b) Misalignment in bearings
c) Acceleration of gears
d) Bearing reactions

_____

SLR-VB – 100

Seat No.	

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
MACHINE DESIGN – II

Day and Date : Monday, 22-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section* ***I*** *and* ***II****.*
2) Make necessary assumptions, if ***required****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Use of non programmable calculator is ***permitted****.*

SECTION – I

2. a) Explain various types of gear tooth failures with remedies. **4**

b) The following data is given for a spur gear pair made of steel.
Module = 8 mm
Centre distance = 380 mm
Permissible bending stress = 75 N/mm^2
Pinion speed = 1500 rpm
Gear speed = 400 rpm
Face width = 80 mm
Tooth system = 20 degree full depth involute
Service factor = 1.5
Factor of safety = 2
Assuming velocity factor to account for dynamic load, calculate the rated power that the gear pair can transmit and suggest the surface hardness for the gears. **10**

3. a) Give the classification of pressure vessels according to IS 2825 : 1969 code. **4**

b) A pair of parallel helical gears consists of a left hand 25 teeth pinion meshing with 45 teeth gear. 5 kW power at 1500 rpm is supplied to the pinion. The normal module in 5 mm and face width is 50 mm. The helix angle is 25° and the normal pressure angle is 20°. Both the gears are made of steel (Sut = 660 N/mm^2) and heat treated to 350 BHN.

i) Determine the radial, tangential and axial components of resultant tooth force acting on meshing teeth of pinion and gear. If pinion is rotating in clockwise direction when viewed from right side, draw the free body diagram for the force components acting on meshing teeth.

ii) Calculate the beam and wear strength of gear tooth.
Assume Y = 0.484 – 2.87/Z' **10**

4. a) What are the various parameters used in optimum design ? **3**

   b) Formulate the PDE, SDE and LE for a simple tensile bar subjected to a tensile load F and having diameter 'd' and length 'L'. The objective of design is minimum weight. **4**

   c) A high pressure cylinder consists of a steel tube with inside diameter and outside diameter of 25 mm and 45 mm respectively. It is jacketed by an outer tube with an outer diameter of 65 mm. The tubes are assembled by a shrinking process in such a way that the shrinkage pressure developed is limited to 35 N/mm^2. Determine the hoop stresses developed due to shrinkage pressure in the inner and outer radius of both the tubes. **7**

SECTION – II

5. a) Explain various mounting methods of bevel gear with neat sketch. **3**

   b) Explain thermal consideration in worm gear. **4**

   c) A pair of worm and worm wheel is designated as 2/52/10/4. 5 kW power is 1000 rpm is supplied to the work shaft. The coefficient of friction is 0.035 and the pressure angle is 20°. Calculate tangential, axial and radial components of resultant gear force acting on the worm and worm wheel ; also calculate the efficiency of worm gear. **7**

6. a) Explain working of hydrodynamic journal bearing with neat sketch. **3**

   b) Derive expression for force analysis of bevel gear. **4**

   c) A pair of straight bevel gears consists of 24 teeth pinion meshing with 48 teeth gear. The module at the large end is 5 mm and facewidth is 40 mm. Gears are made of cast iron (S_{ut} = 220 N/mm^2). The pressure angle is 20°. The pinion rotates at 500 rpm and service factor is 1.5. Assume velocity factor account for dynamic load. Calculate

      i) The static load that the gear can transmit with factor of safety of 1.5 for bending considerations.

      ii) The rated power that the gear can transmit.

      Use $C_v = 6/(6 + v)$, $Y' = 0.484 - 2.87/z'$ **7**

7. a) Explain static load carrying capacity, dynamic load carrying capacity and equivalent bearing load. **3**

   b) A taper roller bearing is subjected to a radial force of 3000N and axial force of 1200 N. The values of X and Y factors are 0.4 and 1.5 respectively. The shaft is rotating at 1000 rpm. If the dynamic capacity of the bearing is 22.9 kN, calculate rated life of the bearing in hours. **4**

c) Following data is given for 360° hydrodynamic bearing

Radial load = 50 kN

Journal speed = 1440 rpm

Journal diameter = 100 mm

Bearing length = 100 mm

Radial clearance = 0.12 mm

Viscosity of lubricant = 16 cP

Calculate :

i) The minimum oil film thickness

ii) Coefficient of friction

iii) Power lost in fiction. **7**

Use Table : 1

l/d	**ε**	**h_0/c**	**S**	**(r/c)f**	**$Q/(rcn_sl)$**
1	0.1	0.9	1.33	26.4	3.37
	0.6	0.4	0.121	3.22	4.33
	0.8	0.2	0.0446	1.70	4.62
	0.9	0.1	0.0188	1.05	4.74
	0.97	0.03	0.00474	0.514	4.82
	1.0	0	0	0	0

———————————

Set P

SLR-VB – 100

Seat No.	

Set **Q**

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
MACHINE DESIGN – II

Day and Date : Monday, 22-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data if necessary and mention it ***clearly****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. I) Multiple correct answer type questions, carrying **two** marks **each**. **8**

A) Which of the following bearings can take load in both radial and axial direction ?
a) Angular Contact Bearing
b) Spherical Roller Bearing
c) Cylindrical Roller Bearing
d) Thrust Ball Bearing

B) Design equations used in the Johnson's method of optimum design are
a) Primary design equation
b) Normal equation
c) Redundant equation
d) Limit equation

C) For pressure vessel made of ductile materials, which of the following equations are suitable ?
a) Lame's equation
b) Clavarino's equation
c) Reynold's equation
d) Birnie's equation

D) Which of the following gear ratios does not require hunting tooth ?
a) 54 : 27 b) 44 : 22
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P.T.O.

II) Single correct answer type questions, carrying **one** marks **each**. **6**

A) The number of grades used to specify the quality of gears is
   a) 10 b) 11
   c) 12 d) 13

B) Lewis equation in spur gears is used to find the
   a) Tensile stress b) Bending stress
   c) Shear stress d) Fatigue stress

C) Static force on gear tooth is due to
   a) Power transmitted by gears
   b) Misalignment in bearings
   c) Acceleration of gears
   d) Bearing reactions

D) The minimum number of teeth on the pinion to operate without interference in standard full height involute teeth gear mechanism with 20° pressure angle is
   a) 14 b) 12
   c) 18 d) 32

E) Maximum stress induced in spherical pressure vessel is _____ for the same pressure and diameter.
   a) Half of that in cylindrical pressure vessel
   b) Double of that in cylindrical pressure vessel
   c) Equal to that in cylindrical pressure vessel
   d) None of the above

F) Boundary lubricated bearing is
   a) Thick film bearing b) Thin film bearing
   c) Hydrodynamic bearing d) Hydrostatic bearing

_____

SLR-VB – 100

Seat No.	

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
MACHINE DESIGN – II

Day and Date : Monday, 22-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section **I** and **II**.*
*2) Make necessary assumptions, if **required**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Use of non programmable calculator is **permitted**.*

SECTION – I

2. a) Explain various types of gear tooth failures with remedies. **4**
   b) The following data is given for a spur gear pair made of steel.
   Module = 8 mm
   Centre distance = 380 mm
   Permissible bending stress = 75 N/mm^2
   Pinion speed = 1500 rpm
   Gear speed = 400 rpm
   Face width = 80 mm
   Tooth system = 20 degree full depth involute
   Service factor = 1.5
   Factor of safety = 2
   Assuming velocity factor to account for dynamic load, calculate the rated power that the gear pair can transmit and suggest the surface hardness for the gears. **10**

3. a) Give the classification of pressure vessels according to IS 2825 : 1969 code. **4**
   b) A pair of parallel helical gears consists of a left hand 25 teeth pinion meshing with 45 teeth gear. 5 kW power at 1500 rpm is supplied to the pinion. The normal module in 5 mm and face width is 50 mm. The helix angle is 25° and the normal pressure angle is 20°. Both the gears are made of steel (Sut = 660 N/mm^2) and heat treated to 350 BHN.
      i) Determine the radial, tangential and axial components of resultant tooth force acting on meshing teeth of pinion and gear. If pinion is rotating in clockwise direction when viewed from right side, draw the free body diagram for the force components acting on meshing teeth.
      ii) Calculate the beam and wear strength of gear tooth.
      Assume Y = 0.484 – 2.87/Z' **10**

Set Q

4. a) What are the various parameters used in optimum design ? **3**

   b) Formulate the PDE, SDE and LE for a simple tensile bar subjected to a tensile load F and having diameter 'd' and length 'L'. The objective of design is minimum weight. **4**

   c) A high pressure cylinder consists of a steel tube with inside diameter and outside diameter of 25 mm and 45 mm respectively. It is jacketed by an outer tube with an outer diameter of 65 mm. The tubes are assembled by a shrinking process in such a way that the shrinkage pressure developed is limited to 35 N/mm^2. Determine the hoop stresses developed due to shrinkage pressure in the inner and outer radius of both the tubes. **7**

SECTION – II

5. a) Explain various mounting methods of bevel gear with neat sketch. **3**

   b) Explain thermal consideration in worm gear. **4**

   c) A pair of worm and worm wheel is designated as 2/52/10/4. 5 kW power is 1000 rpm is supplied to the work shaft. The coefficient of friction is 0.035 and the pressure angle is 20°. Calculate tangential, axial and radial components of resultant gear force acting on the worm and worm wheel ; also calculate the efficiency of worm gear. **7**

6. a) Explain working of hydrodynamic journal bearing with neat sketch. **3**

   b) Derive expression for force analysis of bevel gear. **4**

   c) A pair of straight bevel gears consists of 24 teeth pinion meshing with 48 teeth gear. The module at the large end is 5 mm and facewidth is 40 mm. Gears are made of cast iron (S_{ut} = 220 N/mm^2). The pressure angle is 20°. The pinion rotates at 500 rpm and service factor is 1.5. Assume velocity factor account for dynamic load. Calculate

      i) The static load that the gear can transmit with factor of safety of 1.5 for bending considerations.

      ii) The rated power that the gear can transmit.

      Use $C_v = 6/(6 + v)$, $Y' = 0.484 – 2.87/z'$ **7**

7. a) Explain static load carrying capacity, dynamic load carrying capacity and equivalent bearing load. **3**

   b) A taper roller bearing is subjected to a radial force of 3000N and axial force of 1200 N. The values of X and Y factors are 0.4 and 1.5 respectively. The shaft is rotating at 1000 rpm. If the dynamic capacity of the bearing is 22.9 kN, calculate rated life of the bearing in hours. **4**

c) Following data is given for 360° hydrodynamic bearing

Radial load = 50 kN

Journal speed = 1440 rpm

Journal diameter = 100 mm

Bearing length = 100 mm

Radial clearance = 0.12 mm

Viscosity of lubricant = 16 cP

Calculate :

i) The minimum oil film thickness

ii) Coefficient of friction

iii) Power lost in fiction. **7**

Use Table : 1

l/d	**ε**	**h_0/c**	**S**	**(r/c)f**	**$Q/(rcn_sl)$**
1	0.1	0.9	1.33	26.4	3.37
	0.6	0.4	0.121	3.22	4.33
	0.8	0.2	0.0446	1.70	4.62
	0.9	0.1	0.0188	1.05	4.74
	0.97	0.03	0.00474	0.514	4.82
	1.0	0	0	0	0

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Set Q

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Seat No.	

Set R

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
MACHINE DESIGN – II

Day and Date : Monday, 22-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data if necessary and mention it ***clearly****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. I) Single correct answer type questions, carrying **one** marks **each**. **6**

A) The minimum number of teeth on the pinion to operate without interference in standard full height involute teeth gear mechanism with 20° pressure angle is
   a) 14 b) 12
   c) 18 d) 32

B) Maximum stress induced in spherical pressure vessel is _____ for the same pressure and diameter.
   a) Half of that in cylindrical pressure vessel
   b) Double of that in cylindrical pressure vessel
   c) Equal to that in cylindrical pressure vessel
   d) None of the above

C) Boundary lubricated bearing is
   a) Thick film bearing
   b) Thin film bearing
   c) Hydrodynamic bearing
   d) Hydrostatic bearing

D) The number of grades used to specify the quality of gears is
   a) 10 b) 11
   c) 12 d) 13

P.T.O.

E) Lewis equation in spur gears is used to find the
   a) Tensile stress b) Bending stress
   c) Shear stress d) Fatigue stress

F) Static force on gear tooth is due to
   a) Power transmitted by gears
   b) Misalignment in bearings
   c) Acceleration of gears
   d) Bearing reactions

II) Multiple correct answer type questions, carrying **two** marks **each**. **8**

A) For pressure vessel made of ductile materials, which of the following equations are suitable ?
   a) Lame's equation
   b) Clavarino's equation
   c) Reynold's equation
   d) Birnie's equation

B) Which of the following gear ratios does not require hunting tooth ?
   a) 54 : 27 b) 44 : 22
   c) 51 : 25 d) 61 : 20

C) Which of the following bearings can take load in both radial and axial direction ?
   a) Angular Contact Bearing
   b) Spherical Roller Bearing
   c) Cylindrical Roller Bearing
   d) Thrust Ball Bearing

D) Design equations used in the Johnson's method of optimum design are
   a) Primary design equation
   b) Normal equation
   c) Redundant equation
   d) Limit equation

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SLR-VB – 100

Seat No.	

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
MACHINE DESIGN – II

Day and Date : Monday, 22-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section **I** and **II**.*
*2) Make necessary assumptions, if **required**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Use of non programmable calculator is **permitted**.*

SECTION – I

2. a) Explain various types of gear tooth failures with remedies. **4**
   b) The following data is given for a spur gear pair made of steel.
   Module = 8 mm
   Centre distance = 380 mm
   Permissible bending stress = 75 N/mm^2
   Pinion speed = 1500 rpm
   Gear speed = 400 rpm
   Face width = 80 mm
   Tooth system = 20 degree full depth involute
   Service factor = 1.5
   Factor of safety = 2
   Assuming velocity factor to account for dynamic load, calculate the rated power that the gear pair can transmit and suggest the surface hardness for the gears. **10**

3. a) Give the classification of pressure vessels according to IS 2825 : 1969 code. **4**
   b) A pair of parallel helical gears consists of a left hand 25 teeth pinion meshing with 45 teeth gear. 5 kW power at 1500 rpm is supplied to the pinion. The normal module in 5 mm and face width is 50 mm. The helix angle is 25° and the normal pressure angle is 20°. Both the gears are made of steel (Sut = 660 N/mm^2) and heat treated to 350 BHN.
      i) Determine the radial, tangential and axial components of resultant tooth force acting on meshing teeth of pinion and gear. If pinion is rotating in clockwise direction when viewed from right side, draw the free body diagram for the force components acting on meshing teeth.
      ii) Calculate the beam and wear strength of gear tooth.
      Assume Y = 0.484 – 2.87/Z' **10**

4. a) What are the various parameters used in optimum design ? **3**

   b) Formulate the PDE, SDE and LE for a simple tensile bar subjected to a tensile load F and having diameter 'd' and length 'L'. The objective of design is minimum weight. **4**

   c) A high pressure cylinder consists of a steel tube with inside diameter and outside diameter of 25 mm and 45 mm respectively. It is jacketed by an outer tube with an outer diameter of 65 mm. The tubes are assembled by a shrinking process in such a way that the shrinkage pressure developed is limited to 35 N/mm^2. Determine the hoop stresses developed due to shrinkage pressure in the inner and outer radius of both the tubes. **7**

SECTION – II

5. a) Explain various mounting methods of bevel gear with neat sketch. **3**

   b) Explain thermal consideration in worm gear. **4**

   c) A pair of worm and worm wheel is designated as 2/52/10/4. 5 kW power is 1000 rpm is supplied to the work shaft. The coefficient of friction is 0.035 and the pressure angle is 20°. Calculate tangential, axial and radial components of resultant gear force acting on the worm and worm wheel ; also calculate the efficiency of worm gear. **7**

6. a) Explain working of hydrodynamic journal bearing with neat sketch. **3**

   b) Derive expression for force analysis of bevel gear. **4**

   c) A pair of straight bevel gears consists of 24 teeth pinion meshing with 48 teeth gear. The module at the large end is 5 mm and facewidth is 40 mm. Gears are made of cast iron (S_{ut} = 220 N/mm^2). The pressure angle is 20°. The pinion rotates at 500 rpm and service factor is 1.5. Assume velocity factor account for dynamic load. Calculate

      i) The static load that the gear can transmit with factor of safety of 1.5 for bending considerations.

      ii) The rated power that the gear can transmit.

      Use $C_v = 6/(6 + v)$, $Y' = 0.484 – 2.87/z'$ **7**

7. a) Explain static load carrying capacity, dynamic load carrying capacity and equivalent bearing load. **3**

   b) A taper roller bearing is subjected to a radial force of 3000N and axial force of 1200 N. The values of X and Y factors are 0.4 and 1.5 respectively. The shaft is rotating at 1000 rpm. If the dynamic capacity of the bearing is 22.9 kN, calculate rated life of the bearing in hours. **4**

c) Following data is given for 360° hydrodynamic bearing

Radial load = 50 kN

Journal speed = 1440 rpm

Journal diameter = 100 mm

Bearing length = 100 mm

Radial clearance = 0.12 mm

Viscosity of lubricant = 16 cP

Calculate :

i) The minimum oil film thickness

ii) Coefficient of friction

iii) Power lost in fiction. **7**

Use Table : 1

l/d	**ε**	**h_0/c**	**S**	**(r/c)f**	**$Q/(rcn_sl)$**
1	0.1	0.9	1.33	26.4	3.37
	0.6	0.4	0.121	3.22	4.33
	0.8	0.2	0.0446	1.70	4.62
	0.9	0.1	0.0188	1.05	4.74
	0.97	0.03	0.00474	0.514	4.82
	1.0	0	0	0	0

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Set R

SLR-VB – 100

Seat No.	

Set S

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
MACHINE DESIGN – II

Day and Date : Monday, 22-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data if necessary and mention it ***clearly****.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. I) Single correct answer type questions, carrying **one** marks **each**. **6**

A) The number of grades used to specify the quality of gears is
a) 10 b) 11
c) 12 d) 13

B) Lewis equation in spur gears is used to find the
a) Tensile stress
b) Bending stress
c) Shear stress
d) Fatigue stress

C) Static force on gear tooth is due to
a) Power transmitted by gears
b) Misalignment in bearings
c) Acceleration of gears
d) Bearing reactions

D) The minimum number of teeth on the pinion to operate without interference in standard full height involute teeth gear mechanism with 20° pressure angle is
a) 14 b) 12
c) 18 d) 32

E) Maximum stress induced in spherical pressure vessel is _____ for the same pressure and diameter.
   a) Half of that in cylindrical pressure vessel
   b) Double of that in cylindrical pressure vessel
   c) Equal to that in cylindrical pressure vessel
   d) None of the above

F) Boundary lubricated bearing is
   a) Thick film bearing
   b) Thin film bearing
   c) Hydrodynamic bearing
   d) Hydrostatic bearing

II) Multiple correct answer type questions, carrying **two** marks **each**. **8**

A) Which of the following bearings can take load in both radial and axial direction ?
   a) Angular Contact Bearing
   b) Spherical Roller Bearing
   c) Cylindrical Roller Bearing
   d) Thrust Ball Bearing

B) Design equations used in the Johnson's method of optimum design are
   a) Primary design equation
   b) Normal equation
   c) Redundant equation
   d) Limit equation

C) For pressure vessel made of ductile materials, which of the following equations are suitable ?
   a) Lame's equation
   b) Clavarino's equation
   c) Reynold's equation
   d) Birnie's equation

D) Which of the following gear ratios does not require hunting tooth ?
   a) 54 : 27
   b) 44 : 22
   c) 51 : 25
   d) 61 : 20

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Seat No.	

T.E. (Mechanical) (Part – II) (New – CGPA) Examination, 2017
MACHINE DESIGN – II

Day and Date : Monday, 22-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section **I** and **II**.*
*2) Make necessary assumptions, if **required**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Use of non programmable calculator is **permitted**.*

SECTION – I

2. a) Explain various types of gear tooth failures with remedies. **4**
   b) The following data is given for a spur gear pair made of steel.
   Module = 8 mm
   Centre distance = 380 mm
   Permissible bending stress = 75 N/mm^2
   Pinion speed = 1500 rpm
   Gear speed = 400 rpm
   Face width = 80 mm
   Tooth system = 20 degree full depth involute
   Service factor = 1.5
   Factor of safety = 2
   Assuming velocity factor to account for dynamic load, calculate the rated power that the gear pair can transmit and suggest the surface hardness for the gears. **10**

3. a) Give the classification of pressure vessels according to IS 2825 : 1969 code. **4**
   b) A pair of parallel helical gears consists of a left hand 25 teeth pinion meshing with 45 teeth gear. 5 kW power at 1500 rpm is supplied to the pinion. The normal module in 5 mm and face width is 50 mm. The helix angle is 25° and the normal pressure angle is 20°. Both the gears are made of steel (Sut = 660 N/mm^2) and heat treated to 350 BHN.
      i) Determine the radial, tangential and axial components of resultant tooth force acting on meshing teeth of pinion and gear. If pinion is rotating in clockwise direction when viewed from right side, draw the free body diagram for the force components acting on meshing teeth.
      ii) Calculate the beam and wear strength of gear tooth.
      Assume Y = 0.484 – 2.87/Z' **10**

Set S

4. a) What are the various parameters used in optimum design ? **3**

   b) Formulate the PDE, SDE and LE for a simple tensile bar subjected to a tensile load F and having diameter 'd' and length 'L'. The objective of design is minimum weight. **4**

   c) A high pressure cylinder consists of a steel tube with inside diameter and outside diameter of 25 mm and 45 mm respectively. It is jacketed by an outer tube with an outer diameter of 65 mm. The tubes are assembled by a shrinking process in such a way that the shrinkage pressure developed is limited to 35 N/mm^2. Determine the hoop stresses developed due to shrinkage pressure in the inner and outer radius of both the tubes. **7**

SECTION – II

5. a) Explain various mounting methods of bevel gear with neat sketch. **3**

   b) Explain thermal consideration in worm gear. **4**

   c) A pair of worm and worm wheel is designated as 2/52/10/4. 5 kW power is 1000 rpm is supplied to the work shaft. The coefficient of friction is 0.035 and the pressure angle is 20°. Calculate tangential, axial and radial components of resultant gear force acting on the worm and worm wheel ; also calculate the efficiency of worm gear. **7**

6. a) Explain working of hydrodynamic journal bearing with neat sketch. **3**

   b) Derive expression for force analysis of bevel gear. **4**

   c) A pair of straight bevel gears consists of 24 teeth pinion meshing with 48 teeth gear. The module at the large end is 5 mm and facewidth is 40 mm. Gears are made of cast iron (S_{ut} = 220 N/mm^2). The pressure angle is 20°. The pinion rotates at 500 rpm and service factor is 1.5. Assume velocity factor account for dynamic load. Calculate

      i) The static load that the gear can transmit with factor of safety of 1.5 for bending considerations.

      ii) The rated power that the gear can transmit.

      Use $C_v = 6/(6 + v)$, $Y' = 0.484 – 2.87/z'$ **7**

7. a) Explain static load carrying capacity, dynamic load carrying capacity and equivalent bearing load. **3**

   b) A taper roller bearing is subjected to a radial force of 3000N and axial force of 1200 N. The values of X and Y factors are 0.4 and 1.5 respectively. The shaft is rotating at 1000 rpm. If the dynamic capacity of the bearing is 22.9 kN, calculate rated life of the bearing in hours. **4**

Set S

c) Following data is given for 360° hydrodynamic bearing

Radial load = 50 kN

Journal speed = 1440 rpm

Journal diameter = 100 mm

Bearing length = 100 mm

Radial clearance = 0.12 mm

Viscosity of lubricant = 16 cP

Calculate :

i) The minimum oil film thickness

ii) Coefficient of friction

iii) Power lost in fiction. **7**

Use Table : 1

l/d	**ε**	**h_0/c**	**S**	**(r/c)f**	**$Q/(rcn_sl)$**
1	0.1	0.9	1.33	26.4	3.37
	0.6	0.4	0.121	3.22	4.33
	0.8	0.2	0.0446	1.70	4.62
	0.9	0.1	0.0188	1.05	4.74
	0.97	0.03	0.00474	0.514	4.82
	1.0	0	0	0	0

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Set S

SLR-VB – 101

Seat No.	

Set P

T.E. (Mechanical) (Part – II) (New CGPA) Examination, 2017
Professional Elective – II : EXPERIMENTAL STRESS ANALYSIS

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Make necessary assumptions, if required and mention it clearly.
*4) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Match the pairs : **(4×1=4)**

Column (1)	Column (2)
a) Babinet Soleil method	p) Separation method
b) Shear difference method	q) Compensation method
c) Unknown state of strain	r) High gauge factor
d) Semi-conductor strain gauges	s) Teledeltos paper
	t) Rosette

B) Solve Multiple Correct Answers : **(3×2=6)**

i) Separation methods are
a) Tardy's b) Babinet Soleil
c) Oblique Incidence Method d) Electrical analogy

ii) Semi-conductor strain gauges can be of following types
a) P-type b) Electrical resistance
c) N-type d) Elliptical

iii) Following methods can be used to balance Wheatstone bridge
a) Shunt b) Series
c) Differential shunt d) Differential series

P.T.O.

C) Solve classical objectives : **(4×1=4)**

i) Strain gauges used in opposite arm are of

a) same nature b) opposite nature

c) mixture nature d) none of the above

ii) Output voltage in case of four arm sensitive bridge as compared with one arm sensitive bridge is

a) same b) triple

c) double d) four times (quadruplicated)

iii) Gauge factor is defined as ratio of

a) applied strain to resistance change per unit of initial resistance

b) lateral strain to the linear strain

c) resistance change per unit of initial resistance to applied strain

d) stress to Young's modulus

iv) Half order fringes are seen in circular polariscope with

a) Dark field arrangement b) Light field arrangement

c) Hooke's method d) None of the above

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SLR-VB – 101

Seat No.	

T.E. (Mechanical) (Part – II) (New CGPA) Examination, 2017
Professional Elective – II : EXPERIMENTAL STRESS ANALYSIS

Day and Date : Wednesday, 24-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section* ***I*** *and* ***II****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) Draw ***neat*** *diagrams* ***where*** *necessary.*

4) Make necessary assumptions, if required and mention it clearly.

SECTION – I

2. a) Differentiate between Plane and Circular Polariscope. **4**

   b) Derive the expression for the light intensity seen through analyzer when the stressed model is kept in the dark field circular polariscope. **10**

3. a) Enlist ideal properties of photo elastic material and explain the procedure for sheet casting. **6**

   b) A two dimensional photo-elastic model of a connecting rod was observed in dark field circular polariscope. The isochromatic fringe order at the point of interest was 4.

   A circular disc of the same material of 80 mm diameter was loaded in diametral compression to calculate material fringe value. At the load of 1200 N, the fringe order at the centre of the disc was observed to be 3.

   Calculate the maximum in plane shear stress at the point of interest if its thickness is 6 mm. **8**

4. a) Explain the following : **8**
      i) Oblique Incidence Method
      ii) Electrical Analogy Method.

   b) Explain scaling of model results to prototype. **6**

SECTION – II

5. a) The strain readings measured by an equiangular rosette at a point in the stressed body are as follows ϵ_a = 510 micro-strain, ϵ_b = 390 micro-strain, ϵ_c = 210 micro-strain. Determine the principal strains, principal stresses, its directions and maximum shear stress. Take E = 210 GPa and μ = 0.286. **8**

   b) Explain in brief grid, backing and adhesive materials used in strain gauges. **6**

6. a) Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **6**

   b) Explain various methods of initial balance of Wheatstone's bridge. **8**

7. a) Derive the expression for the output voltage of a two arm and four arm sensitive Wheatstone's bridge subjected to compressive and tensile linear strains. Comment on the output. **8**

   b) Explain with few examples, the use of strain gauge as transducer. **6**

8. a) Explain Moire fringe method with merits, demerits and applications. **7**

   b) Explain Brittle coating method with merits, demerits and applications. **7**

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SLR-VB – 101

Seat No.	

Set Q

T.E. (Mechanical) (Part – II) (New CGPA) Examination, 2017
Professional Elective – II : EXPERIMENTAL STRESS ANALYSIS

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Make necessary assumptions, if required and mention it clearly.
*4) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Solve Multiple Correct Answers : **(3×2=6)**

i) Semi-conductor strain gauges can be of following types

a) P-type b) Electrical resistance
c) N-type d) Elliptical

ii) Separation methods are

a) Tardy's b) Babinet Soleil
c) Oblique Incidence Method d) Electrical analogy

iii) Following methods can be used to balance Wheatstone bridge

a) Shunt b) Series
c) Differential shunt d) Differential series

B) Solve classical objectives : **(4×1=4)**

i) Half order fringes are seen in circular polariscope with

a) Dark field arrangement b) Light field arrangement
c) Hooke's method d) None of the above

P.T.O.

ii) Gauge factor is defined as ratio of

a) applied strain to resistance change per unit of initial resistance

b) lateral strain to the linear strain

c) resistance change per unit of initial resistance to applied strain

d) stress to Young's modulus

iii) Output voltage in case of four arm sensitive bridge as compared with one arm sensitive bridge is

a) same b) triple

c) double d) four times (quadruplicated)

iv) Strain gauges used in opposite arm are of

a) same nature b) opposite nature

c) mixture nature d) none of the above

C) Match the pairs : **(4×1=4)**

Column (1)	**Column (2)**
a) Babinet Soleil method	p) Separation method
b) Shear difference method	q) Compensation method
c) Unknown state of strain	r) High gauge factor
d) Semi-conductor strain gauges	s) Teledeltos paper
	t) Rosette

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SLR-VB – 101

Seat No.	

T.E. (Mechanical) (Part – II) (New CGPA) Examination, 2017
Professional Elective – II : EXPERIMENTAL STRESS ANALYSIS

Day and Date : Wednesday, 24-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section **I** and **II**.*

*2) Figures to the **right** indicate **full** marks.*

*3) Draw **neat** diagrams **where** necessary.*

4) Make necessary assumptions, if required and mention it clearly.

SECTION – I

2. a) Differentiate between Plane and Circular Polariscope. **4**

   b) Derive the expression for the light intensity seen through analyzer when the stressed model is kept in the dark field circular polariscope. **10**

3. a) Enlist ideal properties of photo elastic material and explain the procedure for sheet casting. **6**

   b) A two dimensional photo-elastic model of a connecting rod was observed in dark field circular polariscope. The isochromatic fringe order at the point of interest was 4.

   A circular disc of the same material of 80 mm diameter was loaded in diametral compression to calculate material fringe value. At the load of 1200 N, the fringe order at the centre of the disc was observed to be 3.

   Calculate the maximum in plane shear stress at the point of interest if its thickness is 6 mm. **8**

4. a) Explain the following : **8**
      i) Oblique Incidence Method
      ii) Electrical Analogy Method.

   b) Explain scaling of model results to prototype. **6**

SECTION – II

5. a) The strain readings measured by an equiangular rosette at a point in the stressed body are as follows ϵ_a = 510 micro-strain, ϵ_b = 390 micro-strain, ϵ_c = 210 micro-strain. Determine the principal strains, principal stresses, its directions and maximum shear stress. Take E = 210 GPa and μ = 0.286. **8**

   b) Explain in brief grid, backing and adhesive materials used in strain gauges. **6**

6. a) Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **6**

   b) Explain various methods of initial balance of Wheatstone's bridge. **8**

7. a) Derive the expression for the output voltage of a two arm and four arm sensitive Wheatstone's bridge subjected to compressive and tensile linear strains. Comment on the output. **8**

   b) Explain with few examples, the use of strain gauge as transducer. **6**

8. a) Explain Moire fringe method with merits, demerits and applications. **7**

   b) Explain Brittle coating method with merits, demerits and applications. **7**

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SLR-VB – 101

Seat No.	

Set R

T.E. (Mechanical) (Part – II) (New CGPA) Examination, 2017
Professional Elective – II : EXPERIMENTAL STRESS ANALYSIS

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Make necessary assumptions, if required and mention it clearly.
*4) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Solve classical objectives : **(4×1=4)**

i) Gauge factor is defined as ratio of
   a) applied strain to resistance change per unit of initial resistance
   b) lateral strain to the linear strain
   c) resistance change per unit of initial resistance to applied strain
   d) stress to Young's modulus

ii) Output voltage in case of four arm sensitive bridge as compared with one arm sensitive bridge is
   a) same b) triple
   c) double d) four times (quadruplicated)

iii) Strain gauges used in opposite arm are of
   a) same nature b) opposite nature
   c) mixture nature d) none of the above

iv) Half order fringes are seen in circular polariscope with
   a) Dark field arrangement b) Light field arrangement
   c) Hooke's method d) None of the above

P.T.O.

B) Match the pairs : **(4×1=4)**

Column (1)	**Column (2)**
a) Babinet Soleil method	p) Separation method
b) Shear difference method	q) Compensation method
c) Unknown state of strain	r) High gauge factor
d) Semi-conductor strain gauges	s) Teledeltos paper
	t) Rosette

C) Solve Multiple Correct Answers : **(3×2=6)**

i) Semi-conductor strain gauges can be of following types

a) P-type b) Electrical resistance

c) N-type d) Elliptical

ii) Separation methods are

a) Tardy's b) Babinet Soleil

c) Oblique Incidence Method d) Electrical analogy

iii) Following methods can be used to balance Wheatstone bridge

a) Shunt b) Series

c) Differential shunt d) Differential series

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SLR-VB – 101

Seat No.	

T.E. (Mechanical) (Part – II) (New CGPA) Examination, 2017
Professional Elective – II : EXPERIMENTAL STRESS ANALYSIS

Day and Date : Wednesday, 24-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section **I** and **II**.*

*2) Figures to the **right** indicate **full** marks.*

*3) Draw **neat** diagrams **where** necessary.*

4) Make necessary assumptions, if required and mention it clearly.

SECTION – I

2. a) Differentiate between Plane and Circular Polariscope. **4**

   b) Derive the expression for the light intensity seen through analyzer when the stressed model is kept in the dark field circular polariscope. **10**

3. a) Enlist ideal properties of photo elastic material and explain the procedure for sheet casting. **6**

   b) A two dimensional photo-elastic model of a connecting rod was observed in dark field circular polariscope. The isochromatic fringe order at the point of interest was 4.

   A circular disc of the same material of 80 mm diameter was loaded in diametral compression to calculate material fringe value. At the load of 1200 N, the fringe order at the centre of the disc was observed to be 3.

   Calculate the maximum in plane shear stress at the point of interest if its thickness is 6 mm. **8**

4. a) Explain the following : **8**
      i) Oblique Incidence Method
      ii) Electrical Analogy Method.

   b) Explain scaling of model results to prototype. **6**

SECTION – II

5. a) The strain readings measured by an equiangular rosette at a point in the stressed body are as follows ϵ_a = 510 micro-strain, ϵ_b = 390 micro-strain, ϵ_c = 210 micro-strain. Determine the principal strains, principal stresses, its directions and maximum shear stress. Take E = 210 GPa and μ = 0.286. **8**

   b) Explain in brief grid, backing and adhesive materials used in strain gauges. **6**

6. a) Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **6**

   b) Explain various methods of initial balance of Wheatstone's bridge. **8**

7. a) Derive the expression for the output voltage of a two arm and four arm sensitive Wheatstone's bridge subjected to compressive and tensile linear strains. Comment on the output. **8**

   b) Explain with few examples, the use of strain gauge as transducer. **6**

8. a) Explain Moire fringe method with merits, demerits and applications. **7**

   b) Explain Brittle coating method with merits, demerits and applications. **7**

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SLR-VB – 101

Seat No.	

Set S

T.E. (Mechanical) (Part – II) (New CGPA) Examination, 2017
Professional Elective – II : EXPERIMENTAL STRESS ANALYSIS

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Make necessary assumptions, if required and mention it clearly.
*4) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Solve Multiple Correct Answers : **(3×2=6)**

i) Following methods can be used to balance Wheatstone bridge

a) Shunt b) Series
c) Differential shunt d) Differential series

ii) Semi-conductor strain gauges can be of following types

a) P-type b) Electrical resistance
c) N-type d) Elliptical

iii) Separation methods are

a) Tardy's b) Babinet Soleil
c) Oblique Incidence Method d) Electrical analogy

B) Match the pairs : **(4×1=4)**

Column (1)	Column (2)
a) Babinet Soleil method	p) Separation method
b) Shear difference method	q) Compensation method
c) Unknown state of strain	r) High gauge factor
d) Semi-conductor strain gauges	s) Teledeltos paper
	t) Rosette

P.T.O.

C) Solve classical objectives : **(4×1=4)**

i) Output voltage in case of four arm sensitive bridge as compared with one arm sensitive bridge is

a) same b) triple

c) double d) four times (quadruplicated)

ii) Gauge factor is defined as ratio of

a) applied strain to resistance change per unit of initial resistance

b) lateral strain to the linear strain

c) resistance change per unit of initial resistance to applied strain

d) stress to Young's modulus

iii) Half order fringes are seen in circular polariscope with

a) Dark field arrangement b) Light field arrangement

c) Hooke's method d) None of the above

iv) Strain gauges used in opposite arm are of

a) same nature b) opposite nature

c) mixture nature d) none of the above

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SLR-VB – 101

Seat No.	

T.E. (Mechanical) (Part – II) (New CGPA) Examination, 2017
Professional Elective – II : EXPERIMENTAL STRESS ANALYSIS

Day and Date : Wednesday, 24-5-2017 Marks : 56

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section **I** and **II**.*

*2) Figures to the **right** indicate **full** marks.*

*3) Draw **neat** diagrams **where** necessary.*

4) Make necessary assumptions, if required and mention it clearly.

SECTION – I

2. a) Differentiate between Plane and Circular Polariscope. **4**

   b) Derive the expression for the light intensity seen through analyzer when the stressed model is kept in the dark field circular polariscope. **10**

3. a) Enlist ideal properties of photo elastic material and explain the procedure for sheet casting. **6**

   b) A two dimensional photo-elastic model of a connecting rod was observed in dark field circular polariscope. The isochromatic fringe order at the point of interest was 4.

   A circular disc of the same material of 80 mm diameter was loaded in diametral compression to calculate material fringe value. At the load of 1200 N, the fringe order at the centre of the disc was observed to be 3.

   Calculate the maximum in plane shear stress at the point of interest if its thickness is 6 mm. **8**

4. a) Explain the following : **8**
      i) Oblique Incidence Method
      ii) Electrical Analogy Method.

   b) Explain scaling of model results to prototype. **6**

SECTION – II

5. a) The strain readings measured by an equiangular rosette at a point in the stressed body are as follows ϵ_a = 510 micro-strain, ϵ_b = 390 micro-strain, ϵ_c = 210 micro-strain. Determine the principal strains, principal stresses, its directions and maximum shear stress. Take E = 210 GPa and μ = 0.286. **8**

   b) Explain in brief grid, backing and adhesive materials used in strain gauges. **6**

6. a) Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **6**

   b) Explain various methods of initial balance of Wheatstone's bridge. **8**

7. a) Derive the expression for the output voltage of a two arm and four arm sensitive Wheatstone's bridge subjected to compressive and tensile linear strains. Comment on the output. **8**

   b) Explain with few examples, the use of strain gauge as transducer. **6**

8. a) Explain Moire fringe method with merits, demerits and applications. **7**

   b) Explain Brittle coating method with merits, demerits and applications. **7**

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SLR-VB – 102

Seat No.	

Set **P**

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
Professional Elective – II
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Figures to **right** indicate **full** marks.*
*2) Make **suitable** assumptions if necessary and state it **clearly**.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) Which of the following relation is correct ?
   a) Capacity factor = (utilization factor) × (maximum demand)
   b) Max. demand = (demand factor) × (utilization factor)
   c) Max. demand = connected load
   d) Average load = (load factor) × (max. demand)

2) Extreme economy of power production is achieved when the power plant is
   a) 50% loaded b) 75% loaded
   c) Unloaded d) Totally loaded

3) Plant is used as stand by unit indicated by
   a) Plant is under no use
   b) Low utilization factor of the plant
   c) Plant is used for base load only
   d) Plant is used for peak as well as base loads

4) Peak load plants should have a
   a) Interfacing controlled by remotely b) Quick response
   c) Variable response d) Slow response

5) The capacity of transformer is always rated in terms of
   a) HP b) kVAr c) kVA d) kW

6) In Hopkinson demand rate or two-part tariff the demand rate or fixed charges are
   a) Independent upon energy consumed
   b) Not required
   c) Independent on consumer demand
   d) Depend upon the max. demand of the consumer

7) Maximum value of declination angle is
   a) 23.5° b) 27.5° c) 0° d) – 66.5°

8) If ρ is density, then wind power is always proportional to
   a) ρ b) $1/\rho$ c) ρ^2 d) $\rho^{1/2}$

9) One of the objective of energy management aims
   a) Prevention of pollution b) Regulating the pollution levels
   c) Prevent the energy use d) None of the above

10) The most important step towards energy conservation is
   a) To use an individual transport system
   b) To encourage two-wheeler industry
   c) To improve public transport system
   d) All of the above

11) A good airfoil has a _____ lift to drag ratio.
   a) Low b) Medium c) Zero d) High

12) The Energy Conservation Act, 2001 requires designated consumers to
   a) Appoint/designate certified energy manager
   b) Conduct an energy audit through an accredited energy auditor
   c) Comply with energy consumption norms and standards
   d) All of the above

13) Energy management emphasizes on
   a) Controlling the supply and consumption of energy
   b) Maximizing productivity and comfort levels and minimize energy costs and pollution with effective use of energy
   c) Both a) and b)
   d) None of the above

14) Lift forces and drag forces act on rotor blade _____ and _____ to the air stream respectively.
   a) Parallel, perpendicular b) Parallel, parallel
   c) Perpendicular, parallel d) Perpendicular, perpendicular

SLR-VB – 102

Seat No.	

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
Professional Elective – II
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Wednesday, 24-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Make ***suitable*** *assumption if necessary and state it* ***clearly****.*

SECTION – I

2. a) Describe the impact of energy source on environment. **4**

   b) Describe different load curves and load factors. **4**

   c) The maximum (peak) load on a thermal power plant of 90 mW capacity is 80 mW at an annual load factor of 50%. The loads having maximum demands of 35 mW, 30 mW, 12 mW and 8 mW are connected to the power station. Determine : **6**
      a) Average load on power station
      b) Energy generated per year
      c) Demand factor
      d) Diversity factor.

3. a) Describe organization of Power Sector in India. **4**

   b) Give silent points on selection of site for Power station. **4**

   c) Describe in detail the fixed and operating cost. **3**

   d) Give significant points on selection of generation equipment. **3**

4. Write short note on the following :

   a) Effect of variable load on power plant. **3**

   b) Forms and characteristics of renewable energy sources. **3**

   c) Load sharing between base load and peak load power stations. **3**

   d) Methods of determining depreciation. **3**

   e) Comparison of the various power plants. **2**

SECTION – II

5. a) With neat sketch describe solar radiation geometry. **4**

   b) Discuss the effect of various parameters on the performance of liquid flat plate collector. **4**

   c) Estimate the average daily global radiation on a horizontal surface at Bangalore (77°40'E, 12°59'N) during month of March. If the average sunshine hours per day are 9.5. [Take constants for global radiation (a = 0.18 and b = 0.64), day (n) = 75]. **6**

6. a) Give detailed classification of WEC systems. **4**

   b) Describe in detail critical points of Energy Conservation Act, 2001 and its feature. **4**

   c) Derive the relation for maximum power efficiency in a wind turbine. Comment on conversion of total power of wind into useful power in case of wind turbine. **6**

7. Write short note on the following :

   a) Methods of harnessing geothermal energy. **3**

   b) Energy components of double basin tidal power plant. **3**

   c) High pressure accumulator wave machines. **3**

   d) Energy Audit Instruments. **3**

   e) Duties and responsibilities of energy managers. **2**

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SLR-VB – 102

Seat No.	

Set **Q**

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
Professional Elective – II
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Figures to **right** indicate **full** marks.*
*2) Make **suitable** assumptions if necessary and state it **clearly**.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) If ρ is density, then wind power is always proportional to
a) ρ b) $1/\rho$ c) ρ^2 d) $\rho^{1/2}$

2) One of the objective of energy management aims
a) Prevention of pollution b) Regulating the pollution levels
c) Prevent the energy use d) None of the above

3) The most important step towards energy conservation is
a) To use an individual transport system
b) To encourage two-wheeler industry
c) To improve public transport system
d) All of the above

4) A good airfoil has a _____ lift to drag ratio.
a) Low b) Medium c) Zero d) High

5) The Energy Conservation Act, 2001 requires designated consumers to
a) Appoint/designate certified energy manager
b) Conduct an energy audit through an accredited energy auditor
c) Comply with energy consumption norms and standards
d) All of the above

P.T.O.

6) Energy management emphasizes on
   a) Controlling the supply and consumption of energy
   b) Maximizing productivity and comfort levels and minimize energy costs and pollution with effective use of energy
   c) Both a) and b)
   d) None of the above

7) Lift forces and drag forces act on rotor blade _____ and _____ to the air stream respectively.
   a) Parallel, perpendicular
   b) Parallel, parallel
   c) Perpendicular, parallel
   d) Perpendicular, perpendicular

8) Which of the following relation is correct ?
   a) Capacity factor = (utilization factor) × (maximum demand)
   b) Max. demand = (demand factor) × (utilization factor)
   c) Max. demand = connected load
   d) Average load = (load factor) × (max. demand)

9) Extreme economy of power production is achieved when the power plant is
   a) 50% loaded
   b) 75% loaded
   c) Unloaded
   d) Totally loaded

10) Plant is used as stand by unit indicated by
   a) Plant is under no use
   b) Low utilization factor of the plant
   c) Plant is used for base load only
   d) Plant is used for peak as well as base loads

11) Peak load plants should have a
   a) Interfacing controlled by remotely
   b) Quick response
   c) Variable response
   d) Slow response

12) The capacity of transformer is always rated in terms of
   a) HP
   b) kVAr
   c) kVA
   d) kW

13) In Hopkinson demand rate or two-part tariff the demand rate or fixed charges are
   a) Independent upon energy consumed
   b) Not required
   c) Independent on consumer demand
   d) Depend upon the max. demand of the consumer

14) Maximum value of declination angle is
   a) 23.5°
   b) 27.5°
   c) 0°
   d) – 66.5°

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SLR-VB – 102

Seat No.	

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
Professional Elective – II
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Wednesday, 24-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Make ***suitable*** *assumption if necessary and state it* ***clearly****.*

SECTION – I

2. a) Describe the impact of energy source on environment. **4**

   b) Describe different load curves and load factors. **4**

   c) The maximum (peak) load on a thermal power plant of 90 mW capacity is 80 mW at an annual load factor of 50%. The loads having maximum demands of 35 mW, 30 mW, 12 mW and 8 mW are connected to the power station. Determine : **6**
      a) Average load on power station
      b) Energy generated per year
      c) Demand factor
      d) Diversity factor.

3. a) Describe organization of Power Sector in India. **4**

   b) Give silent points on selection of site for Power station. **4**

   c) Describe in detail the fixed and operating cost. **3**

   d) Give significant points on selection of generation equipment. **3**

4. Write short note on the following :

   a) Effect of variable load on power plant. **3**

   b) Forms and characteristics of renewable energy sources. **3**

   c) Load sharing between base load and peak load power stations. **3**

   d) Methods of determining depreciation. **3**

   e) Comparison of the various power plants. **2**

Set Q

SECTION – II

5. a) With neat sketch describe solar radiation geometry. **4**

   b) Discuss the effect of various parameters on the performance of liquid flat plate collector. **4**

   c) Estimate the average daily global radiation on a horizontal surface at Bangalore (77°40'E, 12°59'N) during month of March. If the average sunshine hours per day are 9.5. [Take constants for global radiation (a = 0.18 and b = 0.64), day (n) = 75]. **6**

6. a) Give detailed classification of WEC systems. **4**

   b) Describe in detail critical points of Energy Conservation Act, 2001 and its feature. **4**

   c) Derive the relation for maximum power efficiency in a wind turbine. Comment on conversion of total power of wind into useful power in case of wind turbine. **6**

7. Write short note on the following :

   a) Methods of harnessing geothermal energy. **3**

   b) Energy components of double basin tidal power plant. **3**

   c) High pressure accumulator wave machines. **3**

   d) Energy Audit Instruments. **3**

   e) Duties and responsibilities of energy managers. **2**

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SLR-VB – 102

Seat No.	

Set R

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
Professional Elective – II
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to* ***right*** *indicate* ***full*** *marks.*
2) Make ***suitable*** *assumptions if necessary and state it* ***clearly****.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :
   1) The capacity of transformer is always rated in terms of
      a) HP b) kVAr c) kVA d) kW
   2) In Hopkinson demand rate or two-part tariff the demand rate or fixed charges are
      a) Independent upon energy consumed
      b) Not required
      c) Independent on consumer demand
      d) Depend upon the max. demand of the consumer
   3) Maximum value of declination angle is
      a) 23.5° b) 27.5° c) 0° d) – 66.5°
   4) If ρ is density, then wind power is always proportional to
      a) ρ b) $1/\rho$ c) ρ^2 d) $\rho^{1/2}$
   5) One of the objective of energy management aims
      a) Prevention of pollution b) Regulating the pollution levels
      c) Prevent the energy use d) None of the above

P.T.O.

6) The most important step towards energy conservation is
   a) To use an individual transport system
   b) To encourage two-wheeler industry
   c) To improve public transport system
   d) All of the above

7) A good airfoil has a _____ lift to drag ratio.
   a) Low b) Medium c) Zero d) High

8) The Energy Conservation Act, 2001 requires designated consumers to
   a) Appoint/designate certified energy manager
   b) Conduct an energy audit through an accredited energy auditor
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9) Energy management emphasizes on
   a) Controlling the supply and consumption of energy
   b) Maximizing productivity and comfort levels and minimize energy costs and pollution with effective use of energy
   c) Both a) and b)
   d) None of the above

10) Lift forces and drag forces act on rotor blade _____ and _____ to the air stream respectively.
   a) Parallel, perpendicular b) Parallel, parallel
   c) Perpendicular, parallel d) Perpendicular, perpendicular

11) Which of the following relation is correct ?
   a) Capacity factor = (utilization factor) × (maximum demand)
   b) Max. demand = (demand factor) × (utilization factor)
   c) Max. demand = connected load
   d) Average load = (load factor) × (max. demand)

12) Extreme economy of power production is achieved when the power plant is
   a) 50% loaded b) 75% loaded
   c) Unloaded d) Totally loaded

13) Plant is used as stand by unit indicated by
   a) Plant is under no use
   b) Low utilization factor of the plant
   c) Plant is used for base load only
   d) Plant is used for peak as well as base loads

14) Peak load plants should have a
   a) Interfacing controlled by remotely b) Quick response
   c) Variable response d) Slow response

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SLR-VB – 102

Seat No.	

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
Professional Elective – II
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Wednesday, 24-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Make ***suitable*** *assumption if necessary and state it* ***clearly****.*

SECTION – I

2. a) Describe the impact of energy source on environment. **4**

   b) Describe different load curves and load factors. **4**

   c) The maximum (peak) load on a thermal power plant of 90 mW capacity is 80 mW at an annual load factor of 50%. The loads having maximum demands of 35 mW, 30 mW, 12 mW and 8 mW are connected to the power station. Determine : **6**
      a) Average load on power station
      b) Energy generated per year
      c) Demand factor
      d) Diversity factor.

3. a) Describe organization of Power Sector in India. **4**

   b) Give silent points on selection of site for Power station. **4**

   c) Describe in detail the fixed and operating cost. **3**

   d) Give significant points on selection of generation equipment. **3**

4. Write short note on the following :

   a) Effect of variable load on power plant. **3**

   b) Forms and characteristics of renewable energy sources. **3**

   c) Load sharing between base load and peak load power stations. **3**

   d) Methods of determining depreciation. **3**

   e) Comparison of the various power plants. **2**

SECTION – II

5. a) With neat sketch describe solar radiation geometry. **4**

   b) Discuss the effect of various parameters on the performance of liquid flat plate collector. **4**

   c) Estimate the average daily global radiation on a horizontal surface at Bangalore (77°40'E, 12°59'N) during month of March. If the average sunshine hours per day are 9.5. [Take constants for global radiation (a = 0.18 and b = 0.64), day (n) = 75]. **6**

6. a) Give detailed classification of WEC systems. **4**

   b) Describe in detail critical points of Energy Conservation Act, 2001 and its feature. **4**

   c) Derive the relation for maximum power efficiency in a wind turbine. Comment on conversion of total power of wind into useful power in case of wind turbine. **6**

7. Write short note on the following :

   a) Methods of harnessing geothermal energy. **3**

   b) Energy components of double basin tidal power plant. **3**

   c) High pressure accumulator wave machines. **3**

   d) Energy Audit Instruments. **3**

   e) Duties and responsibilities of energy managers. **2**

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SLR-VB – 102

Seat No.	

Set S

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
Professional Elective – II
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Figures to **right** indicate **full** marks.*
*2) Make **suitable** assumptions if necessary and state it **clearly**.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answer :

1) The most important step towards energy conservation is
   a) To use an individual transport system
   b) To encourage two-wheeler industry
   c) To improve public transport system
   d) All of the above

2) A good airfoil has a _____ lift to drag ratio.
   a) Low b) Medium c) Zero d) High

3) The Energy Conservation Act, 2001 requires designated consumers to
   a) Appoint/designate certified energy manager
   b) Conduct an energy audit through an accredited energy auditor
   c) Comply with energy consumption norms and standards
   d) All of the above

4) Energy management emphasizes on
   a) Controlling the supply and consumption of energy
   b) Maximizing productivity and comfort levels and minimize energy costs and pollution with effective use of energy
   c) Both a) and b)
   d) None of the above

P.T.O.

5) Lift forces and drag forces act on rotor blade _____ and _____ to the air stream respectively.
   a) Parallel, perpendicular
   b) Parallel, parallel
   c) Perpendicular, parallel
   d) Perpendicular, perpendicular

6) Which of the following relation is correct ?
   a) Capacity factor = (utilization factor) × (maximum demand)
   b) Max. demand = (demand factor) × (utilization factor)
   c) Max. demand = connected load
   d) Average load = (load factor) × (max. demand)

7) Extreme economy of power production is achieved when the power plant is
   a) 50% loaded
   b) 75% loaded
   c) Unloaded
   d) Totally loaded

8) Plant is used as stand by unit indicated by
   a) Plant is under no use
   b) Low utilization factor of the plant
   c) Plant is used for base load only
   d) Plant is used for peak as well as base loads

9) Peak load plants should have a
   a) Interfacing controlled by remotely
   b) Quick response
   c) Variable response
   d) Slow response

10) The capacity of transformer is always rated in terms of
   a) HP
   b) kVAr
   c) kVA
   d) kW

11) In Hopkinson demand rate or two-part tariff the demand rate or fixed charges are
   a) Independent upon energy consumed
   b) Not required
   c) Independent on consumer demand
   d) Depend upon the max. demand of the consumer

12) Maximum value of declination angle is
   a) 23.5°
   b) 27.5°
   c) 0°
   d) – 66.5°

13) If ρ is density, then wind power is always proportional to
   a) ρ
   b) $1/\rho$
   c) ρ^2
   d) $\rho^{1/2}$

14) One of the objective of energy management aims
   a) Prevention of pollution
   b) Regulating the pollution levels
   c) Prevent the energy use
   d) None of the above

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SLR-VB – 102

Seat No.	

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
Professional Elective – II
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Wednesday, 24-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Make ***suitable*** *assumption if necessary and state it* ***clearly****.*

SECTION – I

2. a) Describe the impact of energy source on environment. **4**

   b) Describe different load curves and load factors. **4**

   c) The maximum (peak) load on a thermal power plant of 90 mW capacity is 80 mW at an annual load factor of 50%. The loads having maximum demands of 35 mW, 30 mW, 12 mW and 8 mW are connected to the power station. Determine : **6**
      a) Average load on power station
      b) Energy generated per year
      c) Demand factor
      d) Diversity factor.

3. a) Describe organization of Power Sector in India. **4**

   b) Give silent points on selection of site for Power station. **4**

   c) Describe in detail the fixed and operating cost. **3**

   d) Give significant points on selection of generation equipment. **3**

4. Write short note on the following :

   a) Effect of variable load on power plant. **3**

   b) Forms and characteristics of renewable energy sources. **3**

   c) Load sharing between base load and peak load power stations. **3**

   d) Methods of determining depreciation. **3**

   e) Comparison of the various power plants. **2**

SECTION – II

5. a) With neat sketch describe solar radiation geometry. **4**

   b) Discuss the effect of various parameters on the performance of liquid flat plate collector. **4**

   c) Estimate the average daily global radiation on a horizontal surface at Bangalore (77°40'E, 12°59'N) during month of March. If the average sunshine hours per day are 9.5. [Take constants for global radiation (a = 0.18 and b = 0.64), day (n) = 75]. **6**

6. a) Give detailed classification of WEC systems. **4**

   b) Describe in detail critical points of Energy Conservation Act, 2001 and its feature. **4**

   c) Derive the relation for maximum power efficiency in a wind turbine. Comment on conversion of total power of wind into useful power in case of wind turbine. **6**

7. Write short note on the following :

   a) Methods of harnessing geothermal energy. **3**

   b) Energy components of double basin tidal power plant. **3**

   c) High pressure accumulator wave machines. **3**

   d) Energy Audit Instruments. **3**

   e) Duties and responsibilities of energy managers. **2**

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SLR-VB – 103

Seat No.	

Set **P**

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
MECHANICAL VIBRATION
Professional Elective – II

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Solve **any two** questions from **each** Section – **I** and Section – **II**.*
*4) Figures to the **right** indicate **full** marks.*
*5) Make **suitable** assumptions if necessary and state them **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose correct answer : **(14×1=14)**

1) In a harmonic motion the maximum velocity is
   a) directly proportional to the amplitude
   b) inversely proportional to the amplitude
   c) directly proportional to square of amplitude
   d) independent of amplitude

2) In an undamped single degree of freedom system with spring stiffness K and mass M, the natural frequency is
   a) $\sqrt{[K / M]}$ b) $\sqrt{[M / K]}$ c) K/M d) None

3) A system is said to be overdamped if damping factor for the system is
   a) more than one b) equal to one
   c) less than one d) equal to zero

4) Inforced vibration system vibrates at
   a) natural frequency of system b) frequency of external excitation
   c) both a) and b) d) none

P.T.O.

5) The number of natural frequencies in a two rotor system is
   a) infinite b) zero c) two d) four
6) The unit of viscous damping coefficient is
   a) N-m/sec b) m/N-sec c) N-sec/m d) N-m-sec
7) A two DOF vibration system, which has two natural frequencies, when disturbed will vibrate with
   a) its lower frequency b) its higher frequency
   c) both the natural frequencies d) any of two natural frequencies
8) The equivalent stiffness of spring connected in parallel having stiffness k1 and k2 can be
   a) (1/k1) + (1/k2) b) k1 + k2
   c) (1/k1) – (1/k2) d) None
9) Main properties of vibrating system
   a) Mass and stiffness b) Mass, stiffness and damping
   c) Stiffness and damping d) None
10) Number of degrees of freedom of a continuous system is
   a) Zero b) One
   c) Infinite d) Depends on system
11) Natural frequency of accelerometer is normally of the order
   a) 4 Hz b) 100 Hz
   c) Between 100 Hz to 1000 Hz d) Above 10 kHz
12) In case of non-linear vibration, frequency of system
   a) is constant b) is not constant
   c) cannot be predicted d) none
13) The instrument that measures the displacement of vibrating body is called a
   a) seismometer b) microphone
   c) accelerometer d) none
14) When frequency of external excitation force is equal to natural frequency of vibration
   a) amplitude of vibration is zero
   b) amplitude of vibration is small
   c) amplitude of vibration is very large
   d) none

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SLR-VB – 103

Seat No.	

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
MECHANICAL VIBRATION
Professional Elective – II

Day and Date : Wednesday, 24-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) Solve **any two** questions from **each** Section – **I** and Section – **II**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make **suitable** assumptions if necessary and state them **clearly**.*

SECTION – I

2. a) Define following terms : **8**
   i) Damping Ratio
   ii) Simple Harmonic Motion
   iii) Resonance
   iv) Degree of Freedom.
   b) State the difference between Viscous damping and Coulomb damping. **6**

3. a) Derive governing equation single degree spring mass damped system under harmonic excitation. **7**
   b) Explain logarithmic decrement of spring mass undamped system. **7**

4. a) Derive governing equation of motion for multi-degree vibration system and determine natural frequency of system. **8**
   b) Explain critical speed of shaft. **6**

SECTION – II

5. a) Distinguish between linear and non-linear vibrations. **4**

   b) Explain principle of accelerometer with sketch and frequency curve. **5**

   c) Explain FFT analyzer in brief. **5**

6. a) Explain non-linear vibration with example. **7**

   b) Write a short note on vibration isolation. **7**

7. Write a short note on (attempt **any two**) : **14**

   a) Vibration Measuring Instruments.

   b) Vibration Exciter.

   c) Signal Analysis.

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SLR-VB – 103

Seat No.	

Set **Q**

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
MECHANICAL VIBRATION
Professional Elective – II

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Solve **any two** questions from **each** Section – **I** and Section – **II**.*
*4) Figures to the **right** indicate **full** marks.*
*5) Make **suitable** assumptions if necessary and state them **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose correct answer : **(14×1=14)**

1) The equivalent stiffness of spring connected in parallel having stiffness k1 and k2 can be
   a) (1/k1) + (1/k2) b) k1 + k2
   c) (1/k1) – (1/k2) d) None
2) Main properties of vibrating system
   a) Mass and stiffness
   b) Mass, stiffness and damping
   c) Stiffness and damping
   d) None
3) Number of degrees of freedom of a continuous system is
   a) Zero b) One
   c) Infinite d) Depends on system
4) Natural frequency of accelerometer is normally of the order
   a) 4 Hz b) 100 Hz
   c) Between 100 Hz to 1000 Hz d) Above 10 kHz

P.T.O.

5) In case of non-linear vibration, frequency of system
   a) is constant b) is not constant
   c) cannot be predicted d) none

6) The instrument that measures the displacement of vibrating body is called a
   a) seismometer b) microphone
   c) accelerometer d) none

7) When frequency of external excitation force is equal to natural frequency of vibration
   a) amplitude of vibration is zero
   b) amplitude of vibration is small
   c) amplitude of vibration is very large
   d) none

8) In a harmonic motion the maximum velocity is
   a) directly proportional to the amplitude
   b) inversely proportional to the amplitude
   c) directly proportional to square of amplitude
   d) independent of amplitude

9) In an undamped single degree of freedom system with spring stiffness K and mass M, the natural frequency is
   a) $\sqrt{[K / M]}$ b) $\sqrt{[M / K]}$ c) K/M d) None

10) A system is said to be overdamped if damping factor for the system is
   a) more than one b) equal to one
   c) less than one d) equal to zero

11) Inforced vibration system vibrates at
   a) natural frequency of system b) frequency of external excitation
   c) both a) and b) d) none

12) The number of natural frequencies in a two rotor system is
   a) infinite b) zero c) two d) four

13) The unit of viscous damping coefficient is
   a) N-m/sec b) m/N-sec c) N-sec/m d) N-m-sec

14) A two DOF vibration system, which has two natural frequencies, when disturbed will vibrate with
   a) its lower frequency b) its higher frequency
   c) both the natural frequencies d) any of two natural frequencies

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SLR-VB – 103

Seat No.	

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
MECHANICAL VIBRATION
Professional Elective – II

Day and Date : Wednesday, 24-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) Solve **any two** questions from **each** Section – **I** and Section – **II**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make **suitable** assumptions if necessary and state them **clearly**.*

SECTION – I

2. a) Define following terms : **8**
   i) Damping Ratio
   ii) Simple Harmonic Motion
   iii) Resonance
   iv) Degree of Freedom.
   b) State the difference between Viscous damping and Coulomb damping. **6**

3. a) Derive governing equation single degree spring mass damped system under harmonic excitation. **7**
   b) Explain logarithmic decrement of spring mass undamped system. **7**

4. a) Derive governing equation of motion for multi-degree vibration system and determine natural frequency of system. **8**
   b) Explain critical speed of shaft. **6**

SECTION – II

5. a) Distinguish between linear and non-linear vibrations. **4**

   b) Explain principle of accelerometer with sketch and frequency curve. **5**

   c) Explain FFT analyzer in brief. **5**

6. a) Explain non-linear vibration with example. **7**

   b) Write a short note on vibration isolation. **7**

7. Write a short note on (attempt **any two**) : **14**

   a) Vibration Measuring Instruments.

   b) Vibration Exciter.

   c) Signal Analysis.

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SLR-VB – 103

Seat No.	

Set **R**

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
MECHANICAL VIBRATION
Professional Elective – II

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Solve **any two** questions from **each** Section – **I** and Section – **II**.*
*4) Figures to the **right** indicate **full** marks.*
*5) Make **suitable** assumptions if necessary and state them **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose correct answer : **(14×1=14)**

1) The number of natural frequencies in a two rotor system is
   a) infinite b) zero c) two d) four
2) The unit of viscous damping coefficient is
   a) N-m/sec b) m/N-sec c) N-sec/m d) N-m-sec
3) A two DOF vibration system, which has two natural frequencies, when disturbed will vibrate with
   a) its lower frequency b) its higher frequency
   c) both the natural frequencies d) any of two natural frequencies
4) The equivalent stiffness of spring connected in parallel having stiffness k1 and k2 can be
   a) (1/k1) + (1/k2) b) k1 + k2
   c) (1/k1) – (1/k2) d) None
5) Main properties of vibrating system
   a) Mass and stiffness b) Mass, stiffness and damping
   c) Stiffness and damping d) None

P.T.O.

6) Number of degrees of freedom of a continuous system is
   a) Zero b) One
   c) Infinite d) Depends on system

7) Natural frequency of accelerometer is normally of the order
   a) 4 Hz b) 100 Hz
   c) Between 100 Hz to 1000 Hz d) Above 10 kHz

8) In case of non-linear vibration, frequency of system
   a) is constant b) is not constant
   c) cannot be predicted d) none

9) The instrument that measures the displacement of vibrating body is called a
   a) seismometer b) microphone
   c) accelerometer d) none

10) When frequency of external excitation force is equal to natural frequency of vibration
   a) amplitude of vibration is zero
   b) amplitude of vibration is small
   c) amplitude of vibration is very large
   d) none

11) In a harmonic motion the maximum velocity is
   a) directly proportional to the amplitude
   b) inversely proportional to the amplitude
   c) directly proportional to square of amplitude
   d) independent of amplitude

12) In an undamped single degree of freedom system with spring stiffness K and mass M, the natural frequency is
   a) $\sqrt{[K / M]}$ b) $\sqrt{[M / K]}$ c) K/M d) None

13) A system is said to be overdamped if damping factor for the system is
   a) more than one b) equal to one
   c) less than one d) equal to zero

14) Inforced vibration system vibrates at
   a) natural frequency of system b) frequency of external excitation
   c) both a) and b) d) none

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SLR-VB – 103

Seat No.	

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
MECHANICAL VIBRATION
Professional Elective – II

Day and Date : Wednesday, 24-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) Solve **any two** questions from **each** Section – **I** and Section – **II**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make **suitable** assumptions if necessary and state them **clearly**.*

SECTION – I

2. a) Define following terms : **8**
   i) Damping Ratio
   ii) Simple Harmonic Motion
   iii) Resonance
   iv) Degree of Freedom.
   b) State the difference between Viscous damping and Coulomb damping. **6**

3. a) Derive governing equation single degree spring mass damped system under harmonic excitation. **7**
   b) Explain logarithmic decrement of spring mass undamped system. **7**

4. a) Derive governing equation of motion for multi-degree vibration system and determine natural frequency of system. **8**
   b) Explain critical speed of shaft. **6**

SECTION – II

5. a) Distinguish between linear and non-linear vibrations. **4**

   b) Explain principle of accelerometer with sketch and frequency curve. **5**

   c) Explain FFT analyzer in brief. **5**

6. a) Explain non-linear vibration with example. **7**

   b) Write a short note on vibration isolation. **7**

7. Write a short note on (attempt **any two**) : **14**

   a) Vibration Measuring Instruments.

   b) Vibration Exciter.

   c) Signal Analysis.

———————

SLR-VB – 103

Seat No.	

Set **S**

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
MECHANICAL VIBRATION
Professional Elective – II

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Solve **any two** questions from **each** Section – **I** and Section – **II**.*
*4) Figures to the **right** indicate **full** marks.*
*5) Make **suitable** assumptions if necessary and state them **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose correct answer : **(14×1=14)**

1) Number of degrees of freedom of a continuous system is
   a) Zero b) One
   c) Infinite d) Depends on system
2) Natural frequency of accelerometer is normally of the order
   a) 4 Hz b) 100 Hz
   c) Between 100 Hz to 1000 Hz d) Above 10 kHz
3) In case of non-linear vibration, frequency of system
   a) is constant b) is not constant
   c) cannot be predicted d) none
4) The instrument that measures the displacement of vibrating body is called a
   a) seismometer b) microphone c) accelerometer d) none
5) When frequency of external excitation force is equal to natural frequency of vibration
   a) amplitude of vibration is zero
   b) amplitude of vibration is small
   c) amplitude of vibration is very large
   d) none

P.T.O.

6) In a harmonic motion the maximum velocity is
   a) directly proportional to the amplitude
   b) inversely proportional to the amplitude
   c) directly proportional to square of amplitude
   d) independent of amplitude

7) In an undamped single degree of freedom system with spring stiffness K and mass M, the natural frequency is

   a) $\sqrt{[K / M]}$ b) $\sqrt{[M / K]}$ c) K/M d) None

8) A system is said to be overdamped if damping factor for the system is
   a) more than one b) equal to one
   c) less than one d) equal to zero

9) Inforced vibration system vibrates at
   a) natural frequency of system b) frequency of external excitation
   c) both a) and b) d) none

10) The number of natural frequencies in a two rotor system is
   a) infinite b) zero c) two d) four

11) The unit of viscous damping coefficient is
   a) N-m/sec b) m/N-sec c) N-sec/m d) N-m-sec

12) A two DOF vibration system, which has two natural frequencies, when disturbed will vibrate with
   a) its lower frequency
   b) its higher frequency
   c) both the natural frequencies
   d) any of two natural frequencies

13) The equivalent stiffness of spring connected in parallel having stiffness k1 and k2 can be
   a) (1/k1) + (1/k2) b) k1 + k2
   c) (1/k1) – (1/k2) d) None

14) Main properties of vibrating system
   a) Mass and stiffness b) Mass, stiffness and damping
   c) Stiffness and damping d) None

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SLR-VB – 103

Seat No.	

T.E. (Mech.) (Part – II) (New-CGPA) Examination, 2017
MECHANICAL VIBRATION
Professional Elective – II

Day and Date : Wednesday, 24-5-2017 Marks : 56
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) Solve **any two** questions from **each** Section – **I** and Section – **II**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make **suitable** assumptions if necessary and state them **clearly**.*

SECTION – I

2. a) Define following terms : **8**
   i) Damping Ratio
   ii) Simple Harmonic Motion
   iii) Resonance
   iv) Degree of Freedom.
   b) State the difference between Viscous damping and Coulomb damping. **6**

3. a) Derive governing equation single degree spring mass damped system under harmonic excitation. **7**
   b) Explain logarithmic decrement of spring mass undamped system. **7**

4. a) Derive governing equation of motion for multi-degree vibration system and determine natural frequency of system. **8**
   b) Explain critical speed of shaft. **6**

SECTION – II

5. a) Distinguish between linear and non-linear vibrations. **4**

   b) Explain principle of accelerometer with sketch and frequency curve. **5**

   c) Explain FFT analyzer in brief. **5**

6. a) Explain non-linear vibration with example. **7**

   b) Write a short note on vibration isolation. **7**

7. Write a short note on (attempt **any two**) : **14**

   a) Vibration Measuring Instruments.

   b) Vibration Exciter.

   c) Signal Analysis.

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SLR-VB – 104

Seat No.	

Set P

T.E. (Mechanical Engineering) (Part – II) Examination, 2017
TOOL ENGINEERING (Professional Elective – II) (New-CGPA)

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 7.00 p.m.

Instructions *: i) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*

ii) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Attempt the following single correct answer type questions. **(1×6)**

1) The process by which multiple holes which are very small and close together are cut in a flat work material is

a) Shaving b) Trimming c) Bending d) Perforating

2) In an ASA system, if tool signature is 7-15-6-6-10-16-3 mm, the side rake angle is

a) 15 b) 6 c) 16 d) 3

3) No. of bolts required to clamp die mainly depends upon

a) Stripping force b) Total force on die
c) Die area d) Thickness or stripper

4) For blanking operation clearance is provided on

a) Die b) Punch
c) Die and Punch d) All of these

5) No. of draws depends upon _____

a) $\frac{d}{r}$ b) $\frac{H}{d}$ c) H : d d) None of the above

6) The point angle of twist drill to machine steel is _____

a) 108° b) 118° c) 130° d) 136°

P.T.O.

B) Attempt the following multiple choice correct answer type questions. **(2×4=8)**

7) Which of the following belongs to fixture ?
   a) Tenon b) Guide post
   c) Stripper plate d) Setting block

8) Which of the following are treated as assets ?
   a) Building b) Man power c) Tools d) Equity

9) A body which is free in space has _____ translational and _____ rotational degrees of freedom.
   a) 7, 7 b) 6, 12 c) 8, 8 d) 6, 6

10) Machinability depends upon
   a) micro structure or w/p
   b) chemical compassion of w/p
   c) cutting speed and depth of cut
   d) rigidity of tool and work

_____

SLR-VB – 104

Seat No.	

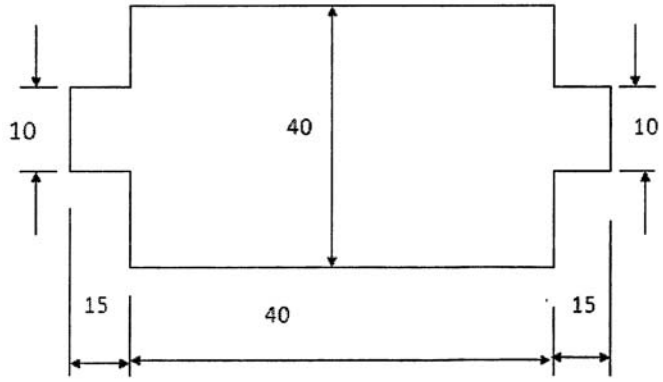
T.E. (Mechanical Engineering) (Part – II) Examination, 2017
TOOL ENGINEERING (Professional Elective – II) (New-CGPA)

Day and Date : Wednesday, 24-5-2017 Marks : 56
Time : 3.00 p.m. to 7.00 p.m.

***Note** : i) Question No. **2** and **6** are **compulsory**.*
*ii) Solve **any two** questions from Section – **I** (from Q. **3, 4** and **5**) and Section – **II** (from Q. **7, 8** and **9**).*

SECTION – I

2. Design press tool for the component shown in fig. – I giving following details. **14**
   i) Cutting force
   ii) Clearance between Die and punch
   iii) Strip Layout and % material utilization
   iv) Punch and die size.
   Also draw one views of assembly of press tool and part list.



Material = 55C8
Thickness = 6 mm
Shear strength = 48 Kg/mm^2

Fig. – I

OR

2. Design a drawing tool for component shown in fig. – II determining the following : **14**
   i) Blank size
   ii) No. of draws
   iii) Draw ratio
   iv) Die and punch clearance
   v) Drawing force
   vi) Blank holding force

Set P

vii) Press capacity
viii) Reduction percentage.

Also draw one view of assembly of draw tool.
Material M.S.
Thickness = 1 mm
Yield stress = 52 Kg/mm^2

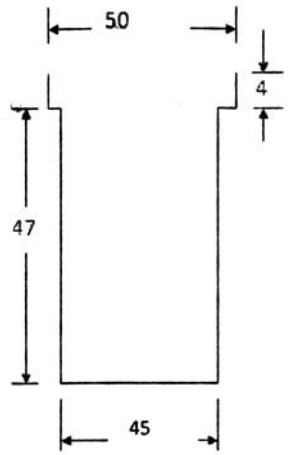


Fig. – II

3. A) What is chip ? Discuss various types of chips produced during metal cutting. **3**

B) In an orthogonal cutting operation the following data have been observed. **4**
Uncut chip thickness = 0.127 mm
Cutting speed = 2.1 m/s
Width of cut = 6.0 mm
Rake angle = 10°
Cutting force = 600 N
Thrust force = 300 N
Chip thickness = 0.3 mm
Determine :
i) Shear angle
ii) Shear strain
iii) Shear force.

4. A) While machining C40 steel with HSS tool at a feed rate of 0.2 mm/rev. and 2 mm depth of cut following observations were noted. **4**
Cutting speed (m/min) 20 35
Tool life (hrs.) 1.5 0.333
Assuming Taylor's equation as $VT^n = C$ recommend the speed for tool life of 2 hours.

B) Write down the difference between orthogonal and oblique cutting. **3**

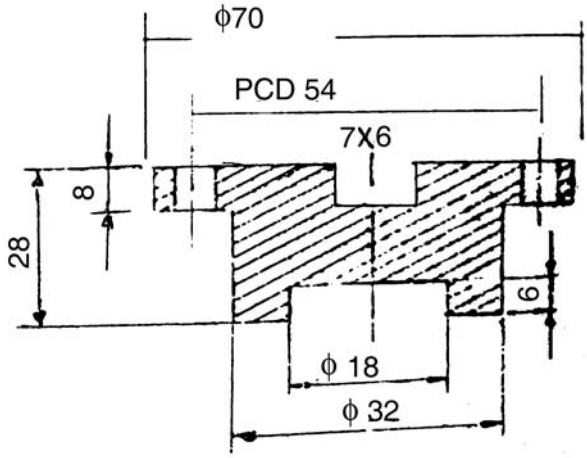
5. Write a short note on (**any two**) : **7**
   A) Types of Bending Dies
   B) Methods to reduce the cutting forces in press tool
   C) Tool Dynamometer.

SECTION – II

6. Design and draw a drilling jig for component shown in fig. below. For the 4 holes of dia. 10 mm.

OR

6. Design and draw a Milling fixture for component shown in fig. below. For the slot of 7 × 6 mm. **14**



7. A) Describe the nomenclature and geometry of a twist drill. **4**
   B) Explain types of jig bushes. **3**

8. A) The initial cost for machine A is Rs. 12,000 and the unit production cost of machine is Rs. 6.00 each. For the other machine B, the initial cost is Rs. 48,000 and unit cost production cost is Rs. 1.20 each. Do the break even analysis. **4**
   B) Explain in brief EOQ for batch production. **3**

9. Write a short note (**any two**) : **7**
   A) Locating devices
   B) 3-2-1 Principle
   C) Milling cutters.

Set P

SLR-VB – 104

Seat No.	

Set Q

T.E. (Mechanical Engineering) (Part – II) Examination, 2017
TOOL ENGINEERING (Professional Elective – II) (New-CGPA)

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 7.00 p.m.

Instructions *: i) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*

ii) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Attempt the following single correct answer type questions. **(1×6)**

1) No. of draws depends upon _____

a) $\frac{d}{r}$ b) $\frac{H}{d}$ c) H : d d) None of the above

2) The point angle of twist drill to machine steel is _____

a) 108° b) 118° c) 130° d) 136°

3) The process by which multiple holes which are very small and close together are cut in a flat work material is

a) Shaving b) Trimming c) Bending d) Perforating

4) In an ASA system, if tool signature is 7-15-6-6-10-16-3 mm, the side rake angle is

a) 15 b) 6 c) 16 d) 3

5) No. of bolts required to clamp die mainly depends upon

a) Stripping force b) Total force on die
c) Die area d) Thickness or stripper

6) For blanking operation clearance is provided on

a) Die b) Punch
c) Die and Punch d) All of these

P.T.O.

B) Attempt the following multiple choice correct answer type questions. **(2×4=8)**

7) Machinability depends upon
   a) micro structure or w/p
   b) chemical compassion of w/p
   c) cutting speed and depth of cut
   d) rigidity of tool and work

8) A body which is free in space has _____ translational and _____ rotational degrees of freedom.
   a) 7, 7 b) 6, 12 c) 8, 8 d) 6, 6

9) Which of the following belongs to fixture ?
   a) Tenon b) Guide post
   c) Stripper plate d) Setting block

10) Which of the following are treated as assets ?
   a) Building b) Man power c) Tools d) Equity

_____

SLR-VB – 104

Seat No.	

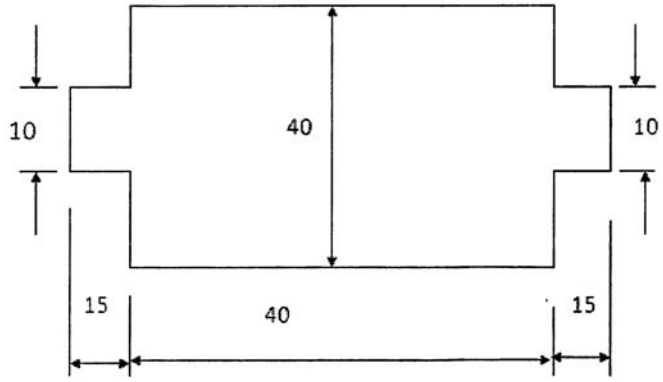
T.E. (Mechanical Engineering) (Part – II) Examination, 2017
TOOL ENGINEERING (Professional Elective – II) (New-CGPA)

Day and Date : Wednesday, 24-5-2017 Marks : 56
Time : 3.00 p.m. to 7.00 p.m.

***Note** : i) Question No. **2** and **6** are **compulsory**.*
*ii) Solve **any two** questions from Section – **I** (from Q. **3, 4** and **5**) and Section – **II** (from Q. **7, 8** and **9**).*

SECTION – I

2. Design press tool for the component shown in fig. – I giving following details. **14**
   i) Cutting force
   ii) Clearance between Die and punch
   iii) Strip Layout and % material utilization
   iv) Punch and die size.
   Also draw one views of assembly of press tool and part list.



Material = 55C8
Thickness = 6 mm
Shear strength = 48 Kg/mm^2

Fig. – I

OR

2. Design a drawing tool for component shown in fig. – II determining the following : **14**
   i) Blank size
   ii) No. of draws
   iii) Draw ratio
   iv) Die and punch clearance
   v) Drawing force
   vi) Blank holding force

Set Q

vii) Press capacity
viii) Reduction percentage.

Also draw one view of assembly of draw tool.
Material M.S.
Thickness = 1 mm
Yield stress = 52 Kg/mm^2

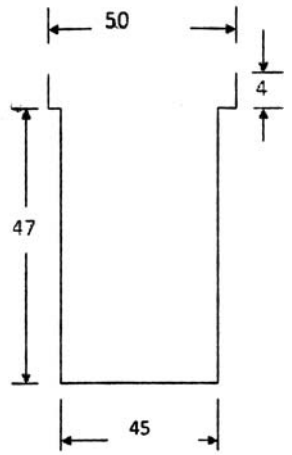


Fig. – II

3. A) What is chip ? Discuss various types of chips produced during metal cutting. **3**

B) In an orthogonal cutting operation the following data have been observed. **4**
Uncut chip thickness = 0.127 mm
Cutting speed = 2.1 m/s
Width of cut = 6.0 mm
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Cutting force = 600 N
Thrust force = 300 N
Chip thickness = 0.3 mm
Determine :
i) Shear angle
ii) Shear strain
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4. A) While machining C40 steel with HSS tool at a feed rate of 0.2 mm/rev. and 2 mm depth of cut following observations were noted. **4**
Cutting speed (m/min) 20 35
Tool life (hrs.) 1.5 0.333
Assuming Taylor's equation as $VT^n = C$ recommend the speed for tool life of 2 hours.

B) Write down the difference between orthogonal and oblique cutting. **3**

Set Q

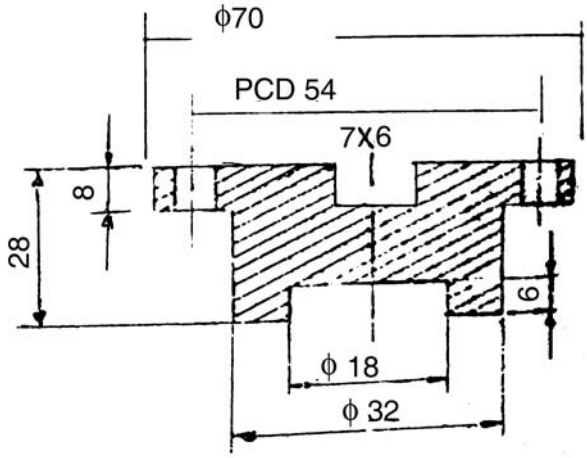
5. Write a short note on (**any two**) : **7**
   A) Types of Bending Dies
   B) Methods to reduce the cutting forces in press tool
   C) Tool Dynamometer.

SECTION – II

6. Design and draw a drilling jig for component shown in fig. below. For the 4 holes of dia. 10 mm.

OR

6. Design and draw a Milling fixture for component shown in fig. below. For the slot of 7 × 6 mm. **14**



7. A) Describe the nomenclature and geometry of a twist drill. **4**
   B) Explain types of jig bushes. **3**

8. A) The initial cost for machine A is Rs. 12,000 and the unit production cost of machine is Rs. 6.00 each. For the other machine B, the initial cost is Rs. 48,000 and unit cost production cost is Rs. 1.20 each. Do the break even analysis. **4**
   B) Explain in brief EOQ for batch production. **3**

9. Write a short note (**any two**) : **7**
   A) Locating devices
   B) 3-2-1 Principle
   C) Milling cutters.

Set Q

SLR-VB – 104

Seat No.	

Set R

T.E. (Mechanical Engineering) (Part – II) Examination, 2017
TOOL ENGINEERING (Professional Elective – II) (New-CGPA)

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 7.00 p.m.

Instructions *: i) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*

ii) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Attempt the following single correct answer type questions. **(1×6)**

1) No. of bolts required to clamp die mainly depends upon
   a) Stripping force b) Total force on die
   c) Die area d) Thickness or stripper

2) For blanking operation clearance is provided on
   a) Die b) Punch
   c) Die and Punch d) All of these

3) No. of draws depends upon _____
   a) $\frac{d}{r}$ b) $\frac{H}{d}$ c) H : d d) None of the above

4) The point angle of twist drill to machine steel is _____
   a) 108° b) 118° c) 130° d) 136°

5) The process by which multiple holes which are very small and close together are cut in a flat work material is
   a) Shaving b) Trimming c) Bending d) Perforating

6) In an ASA system, if tool signature is 7-15-6-6-10-16-3 mm, the side rake angle is
   a) 15 b) 6 c) 16 d) 3

P.T.O.

B) Attempt the following multiple choice correct answer type questions. **(2×4=8)**

7) A body which is free in space has _____ translational and _____ rotational degrees of freedom.
   a) 7, 7 b) 6, 12 c) 8, 8 d) 6, 6

8) Machinability depends upon
   a) micro structure or w/p
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   c) cutting speed and depth of cut
   d) rigidity of tool and work

9) Which of the following are treated as assets ?
   a) Building b) Man power c) Tools d) Equity

10) Which of the following belongs to fixture ?
   a) Tenon b) Guide post
   c) Stripper plate d) Setting block

_____

SLR-VB – 104

Seat No.	

T.E. (Mechanical Engineering) (Part – II) Examination, 2017
TOOL ENGINEERING (Professional Elective – II) (New-CGPA)

Day and Date : Wednesday, 24-5-2017 Marks : 56
Time : 3.00 p.m. to 7.00 p.m.

Note : *i) Question No. **2** and **6** are **compulsory**.*
*ii) Solve **any two** questions from Section – **I** (from Q. **3, 4** and **5**) and Section – **II** (from Q. **7, 8** and **9**).*

SECTION – I

2. Design press tool for the component shown in fig. – I giving following details. **14**
   i) Cutting force
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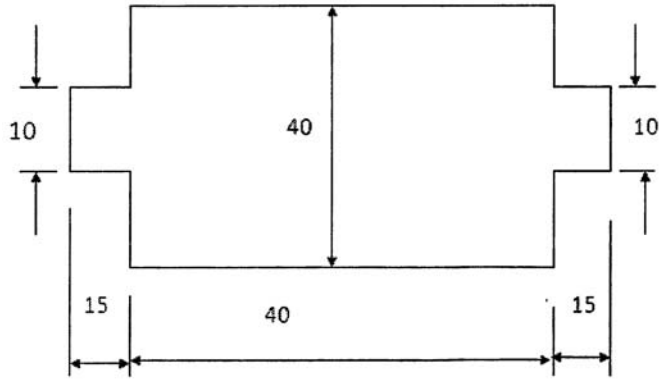
   iv) Punch and die size.
   Also draw one views of assembly of press tool and part list.



Material = 55C8
Thickness = 6 mm
Shear strength = 48 Kg/mm^2

Fig. – I

OR

2. Design a drawing tool for component shown in fig. – II determining the following : **14**
   i) Blank size
   ii) No. of draws
   iii) Draw ratio
   iv) Die and punch clearance
   v) Drawing force
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Set R

vii) Press capacity
viii) Reduction percentage.

Also draw one view of assembly of draw tool.
Material M.S.
Thickness = 1 mm
Yield stress = 52 Kg/mm^2

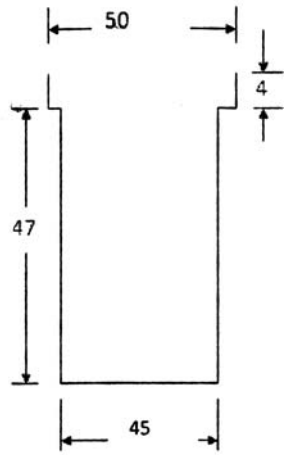

Fig. – II

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Cutting speed (m/min) 20 35
Tool life (hrs.) 1.5 0.333
Assuming Taylor's equation as $VT^n = C$ recommend the speed for tool life of 2 hours.

B) Write down the difference between orthogonal and oblique cutting. **3**

Set R

5. Write a short note on (**any two**) : **7**
   A) Types of Bending Dies
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   C) Tool Dynamometer.

SECTION – II

6. Design and draw a drilling jig for component shown in fig. below. For the 4 holes of dia. 10 mm.

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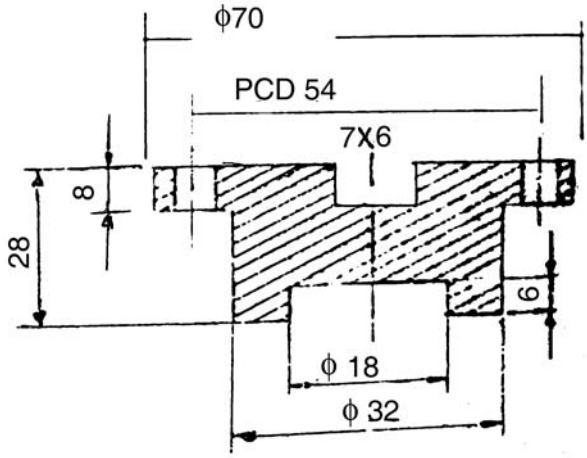

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   A) Locating devices
   B) 3-2-1 Principle
   C) Milling cutters.

Set R

SLR-VB – 104

Seat No.	

Set S

T.E. (Mechanical Engineering) (Part – II) Examination, 2017
TOOL ENGINEERING (Professional Elective – II) (New-CGPA)

Day and Date : Wednesday, 24-5-2017 Max. Marks : 70
Time : 3.00 p.m. to 7.00 p.m.

Instructions *: i) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.*

ii) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. A) Attempt the following single correct answer type questions. **(1×6)**

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2) No. of draws depends upon _____
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P.T.O.

B) Attempt the following multiple choice correct answer type questions. **(2×4=8)**

7) Which of the following are treated as assets ?
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8) Which of the following belongs to fixture ?
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9) Machinability depends upon
   a) micro structure or w/p
   b) chemical compassion of w/p
   c) cutting speed and depth of cut
   d) rigidity of tool and work

10) A body which is free in space has _____ translational and _____ rotational degrees of freedom.
   a) 7, 7 b) 6, 12 c) 8, 8 d) 6, 6

_____

SLR-VB – 104

Seat No.	

T.E. (Mechanical Engineering) (Part – II) Examination, 2017
TOOL ENGINEERING (Professional Elective – II) (New-CGPA)

Day and Date : Wednesday, 24-5-2017 Marks : 56
Time : 3.00 p.m. to 7.00 p.m.

***Note** : i) Question No. **2** and **6** are **compulsory**.*
*ii) Solve **any two** questions from Section – **I** (from Q. **3, 4** and **5**) and Section – **II** (from Q. **7, 8** and **9**).*

SECTION – I

2. Design press tool for the component shown in fig. – I giving following details. **14**
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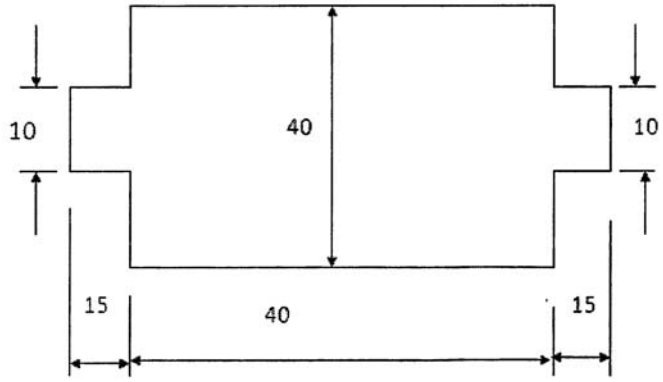

Material = 55C8
Thickness = 6 mm
Shear strength = 48 Kg/mm^2

Fig. – I

OR

2. Design a drawing tool for component shown in fig. – II determining the following : **14**
   i) Blank size
   ii) No. of draws
   iii) Draw ratio
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   v) Drawing force
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Set S

vii) Press capacity
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Also draw one view of assembly of draw tool.
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Thickness = 1 mm
Yield stress = 52 Kg/mm^2

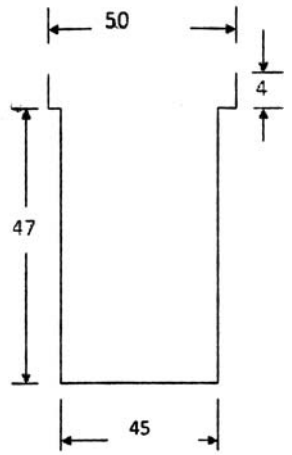

Fig. – II

3. A) What is chip ? Discuss various types of chips produced during metal cutting. **3**

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Set S

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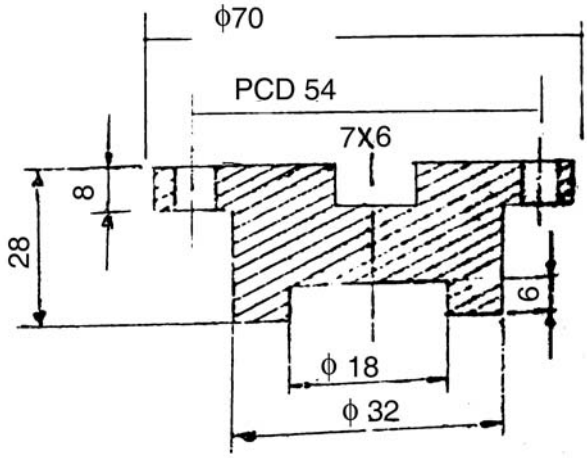

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9. Write a short note (**any two**) : **7**
   A) Locating devices
   B) 3-2-1 Principle
   C) Milling cutters.

Set S

SLR-VB – 105

Seat No.	

Set **P**

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Friday, 5-5-2017 Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Manual control system is
   a) Closed loop system b) Open loop system
   c) Hybrid system d) None of these

2) In a control system output of the controller is given to
   a) Comparator b) Final Control element
   c) System to be controlled d) Sensor

3) In direct analogy between electric and pneumatic system, current is analogous to
   a) Pressure b) Mass of air
   c) Mass flow rate of air d) Volume flow rate of air

4) In direct analogy between electric and liquid level system, voltage is analogous to
   a) Liquid volume b) Liquid flow rate
   c) Discharge through valve d) Head

5) In hydraulic servomotor _____ acts as a comparator.
   a) Walking Beam linkage b) Hydraulic Cylinder
   c) D.C. valve d) None of these

6) Speed of the armature controlled D.C. motor is controlled by
   a) Armature Voltage b) Field voltage c) Field Current d) None of these

7) Two components of a system are in parallel having transfer functions G_1 and G_2. This system can by replaced by equivalent system with transfer function
   a) $G_1 * G_2$ b) $G_1 + G_2$ c) $G_1/(G_1-G_2)$ d) $G_1/(G_1+G_2)$

8) A linear system is subjected to two inputs R_1 and R_2, respective outputs are C_1 and C_2, G_1 is transfer functions between R_1 and C_1, G_2 is transfer function between R_2 and C_2. The overall output 'C' of the system is given by _____
   a) $C = G_1 * R_2 + G_2 * R_1$ b) $C = G_1/R_1 + G_2/R_2$
   c) $C = G_1 * R_1 + G_2 * R_2$ d) $C = R_1/G_1 + R_2/G_2$

9) For a control system, 'c', 'u' and 'v' denote change in output, change in disturbance and change in input respectively from operating point. With controller equation as $G_1(D) = K_1/D$, the steady state relation of the system will be
   a) c = v + u b) c = u c) c = v d) c = v – u

P.T.O.

10) The nature of the controller line will be vertical for a system with controller equation as
a) $G_1(D) = K_1/D$ b) $G_1(D) = K_1/(1 + 2 * D)$
c) $G_1(D) = K_1 * D$ d) None of these

11) The transfer function of a system is given by $\frac{s^2 + 2s + 4}{s + 1}$. The system has ____ zeros.
a) simple b) complex c) repeated d) none of these

12) For a controller with integral action _____ behavior of the system will be better.
a) Transient b) Steady state
c) Both a) and b) d) None of these

13) For P + I control action, in the beginning (t = 0) output of the controller will be dominated by _____ mode.
a) Proportional b) Integral c) Both a) and b) d) None of these

14) Root locus for a system does not intersect with 'jw' axis (Imaginary axis). The system will be
a) Unstable b) Marginally stable
c) Stable for all gain values d) Conditionally stable

15) The utility of the angle condition in root locus is _____
a) to know the phase angle
b) to know the gain of the system
c) to know the stability of the system
d) to check whether given point lies on root locus or not

16) The transfer function of a system is given by, $\frac{s^2 + 2s + 4}{(s + 1)(s + 3)}$, _____ number of asymptotes is/are needed to draw the root locus.
a) 1 b) 2 c) 3 d) 0

17) For a marginal stable system, this is true
a) GM and PM are positive b) GM and PM are negative
c) GM positive and PM negative d) GM = PM = 0

18) For 0 < K < 1, magnitude plot will be _____, K is gain of the system.
a) Above 0 db line b) Below 0 db line
c) 0 db line d) None of these

19) The contribution of one zero at the origin of the 'S' plane in a magnitude plot is a straight line with _____ slope and passing through the intersection of 0 db line and _____ line.
a) 20 db/decade, ω = 10 rad/sec. b) – 20 db/decade, ω = 10 rad/sec.
c) 20 db/decade, ω = 1 rad/sec. d) – 20 db/decade, ω = 1 rad/sec

20) State space model is
a) Not unique for a system b) Suitable for non linear systems
c) Both a) and b) d) None of these

_____

SLR-VB – 105

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Friday, 5-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of non programmable calculator is **allowed**.*
*4) Assume any additional data **if necessary** and state **it clearly**.*
*5) **Use** university graph papers and semi log papers **if needed**.*

SECTION – I

2. a) Explain closed loop system in detail with basic block diagram. Give one example of a closed loop system along with block diagram. **7**

b) Find overall transfer function of a system represented by block diagram fig 1. **7**

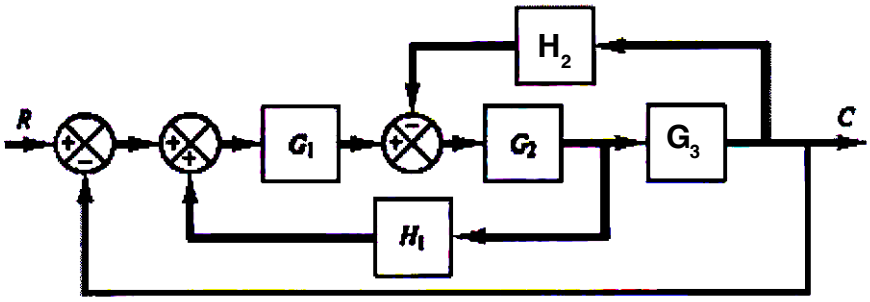

Fig.1

3. a) Explain hydraulic amplifier in detail and obtain its transfer function considering the effect of mass. **7**

b) For a electric shown in Fig. 2, find differential equation relating e_0 and e_1. **6**

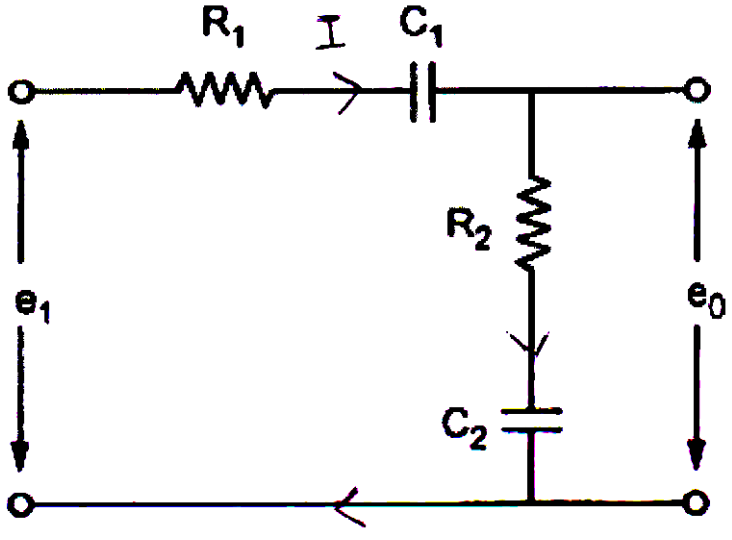

Fig. 2

Set P

4. a) For a mechanical system shown in fig. 3 find the relation between : **7**

i) F and X ii) F and Y iii) X and Y.

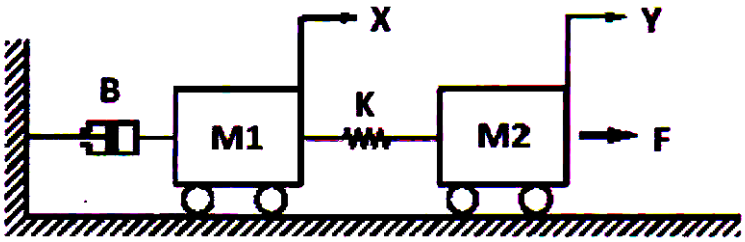

Fig.3

b) For a triangle 'X' is the length of base, 'Y' is the length of the side which is adjacent to the base and 'θ' is the angle between these two sides. The reference point values are $X_i = 10$, $Y_i = 16$ and $\theta_i = 30°$. Determine the linear approximation for area 'A'. Find the approximate area when X = 9, Y = 18, and $\theta = 33°$. (Refer Fig. 4). **6**

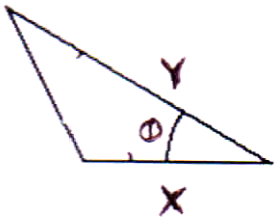

Fig. 4

5. a) Steady state operating curves for unity feedback system are shown in fig. 5. Using these curves find the steady state constants, draw steady state block diagram and also find the steady state relation of the system. ($M_i = 6$, $C_i = 400$). **7**

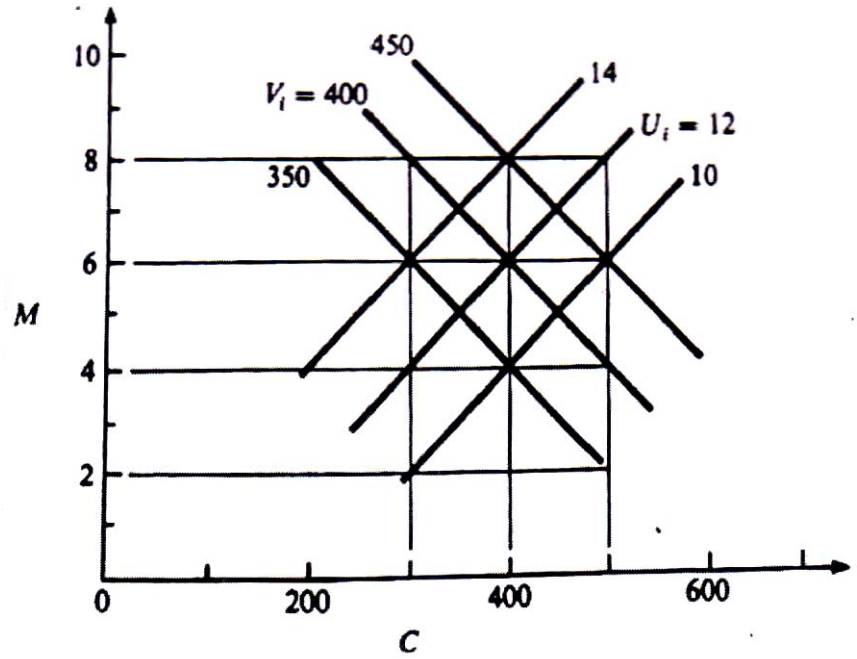

Fig. 5

Set P

b) The characteristics of an engine are described by the family of curves shown in fig. 6. Determine the linear approximation for torque 't' delivered by the engine. The reference point is $N_i = 3000$, $Q_i = 50$. When torque 't' is greater than the load torque t_L, the excess torque $(t - t_L)$ is used to accelerate the engine so that $t - t_L = J \frac{dn}{dt}$. For J = 0.025 determine the differential equation relating change in speed to change in fuel flow and change in load.
Aslo find the time constant of the system. **6**

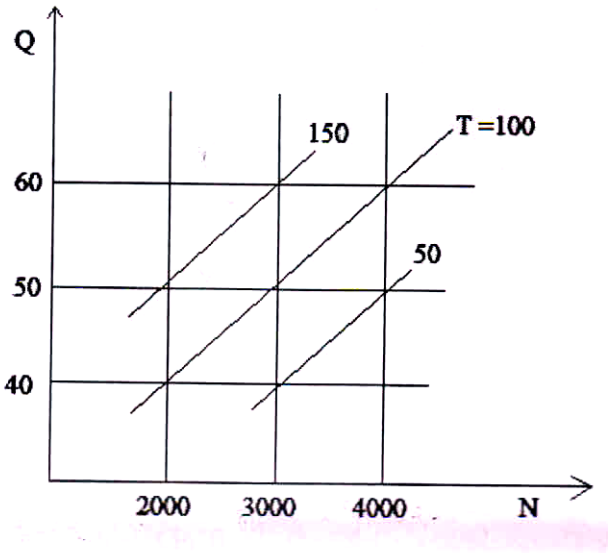

Fig.6

SECTION – II

6. a) Explain On Off control action in detail along with controller input and output curves for pure on off action and practical on off action. Also mention application and limitations of this mode. **7**

b) For a system shown in fig. 7, using Routh's stability criteria find the range of the gain for which system is stable. $G(S) = \frac{K}{s(s^2 + s + 1)(s + 2)}$. **6**

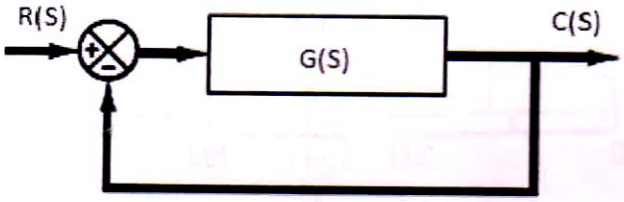

Fig.7

7. a) Derive the response equation of first order system subjected to unit step input. **5**

   b) For a unity feedback system, $G(S) = \frac{K(s+6)}{s(s+2)(s+3)}$. Construct the root locus for this system and comment on the stability of the system. **8**

8. a) Explain the term Break away point in relation with root locus. **5**

   b) For a unity feedback system, $G(S) = \frac{2000(s+1)}{s(s+10)(s+40)}$ .Draw the bode plot for this system and find GM, PM, ω_{gc} and ω_{pc} . Also comment on the stability of the system. **9**

9. a) Explain the bode plot for a simple pole in detail. (With equations, assumptions and respective plots). **5**

   b) Determine the state space representation for the feedback control system shown in fig. 8 using direct programming. Also construct the computer diagram for this system. $G(S) = \frac{2}{(D^2 + 7D + 10)}$. **8**

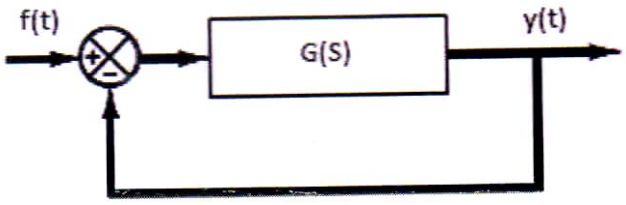

Fig.8

SLR-VB – 105

Seat No.	

Set **Q**

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Friday, 5-5-2017 Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The transfer function of a system is given by, $\frac{s^2 + 2s + 4}{(s+1)(s+3)}$, _____ number of asymptotes is/are needed to draw the root locus.
   a) 1 b) 2 c) 3 d) 0

2) For a marginal stable system, this is true
   a) GM and PM are positive b) GM and PM are negative
   c) GM positive and PM negative d) GM = PM = 0

3) For 0 < K < 1, magnitude plot will be _____, K is gain of the system.
   a) Above 0 db line b) Below 0 db line
   c) 0 db line d) None of these

4) The contribution of one zero at the origin of the 'S' plane in a magnitude plot is a straight line with _____ slope and passing through the intersection of 0 db line and _____ line.
   a) 20 db/decade, ω = 10 rad/sec. b) – 20 db/decade, ω = 10 rad/sec.
   c) 20 db/decade, ω = 1 rad/sec. d) – 20 db/decade, ω = 1 rad/sec

5) State space model is
   a) Not unique for a system b) Suitable for non linear systems
   c) Both a) and b) d) None of these

6) Manual control system is
   a) Closed loop system b) Open loop system
   c) Hybrid system d) None of these

7) In a control system output of the controller is given to
   a) Comparator b) Final Control element
   c) System to be controlled d) Sensor

8) In direct analogy between electric and pneumatic system, current is analogous to
   a) Pressure b) Mass of air
   c) Mass flow rate of air d) Volume flow rate of air

P.T.O.

9) In direct analogy between electric and liquid level system, voltage is analogous to
   a) Liquid volume b) Liquid flow rate
   c) Discharge through valve d) Head
10) In hydraulic servomotor _____ acts as a comparator.
   a) Walking Beam linkage b) Hydraulic Cylinder
   c) D.C. valve d) None of these
11) Speed of the armature controlled D.C. motor is controlled by
   a) Armature Voltage b) Field voltage c) Field Current d) None of these
12) Two components of a system are in parallel having transfer functions G_1 and G_2. This system can by replaced by equivalent system with transfer function
   a) $G_1 * G_2$ b) $G_1 + G_2$ c) $G_1/(G_1-G_2)$ d) $G_1/(G_1+G_2)$
13) A linear system is subjected to two inputs R_1 and R_2, respective outputs are C_1 and C_2, G_1 is transfer functions between R_1 and C_1, G_2 is transfer function between R_2 and C_2. The overall output 'C' of the system is given by _____
   a) $C = G_1 * R_2 + G_2 * R_1$ b) $C = G_1/R_1 + G_2/R_2$
   c) $C = G_1 * R_1 + G_2 * R_2$ d) $C = R_1/G_1 + R_2/G_2$
14) For a control system, 'c', 'u' and 'v' denote change in output, change in disturbance and change in input respectively from operating point. With controller equation as $G_1(D) = K_1/D$, the steady state relation of the system will be
   a) $c = v + u$ b) $c = u$ c) $c = v$ d) $c = v - u$
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18) For P + I control action, in the beginning (t = 0) output of the controller will be dominated by _____ mode.
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19) Root locus for a system does not intersect with 'jw' axis (Imaginary axis). The system will be
   a) Unstable b) Marginally stable
   c) Stable for all gain values d) Conditionally stable
20) The utility of the angle condition in root locus is _____
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   b) to know the gain of the system
   c) to know the stability of the system
   d) to check whether given point lies on root locus or not

_____

SLR-VB – 105

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Friday, 5-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any three** questions from **each** Section.*
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*3) **Use** of non programmable calculator is **allowed**.*
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SECTION – I

2. a) Explain closed loop system in detail with basic block diagram. Give one example of a closed loop system along with block diagram. **7**

b) Find overall transfer function of a system represented by block diagram fig 1. **7**

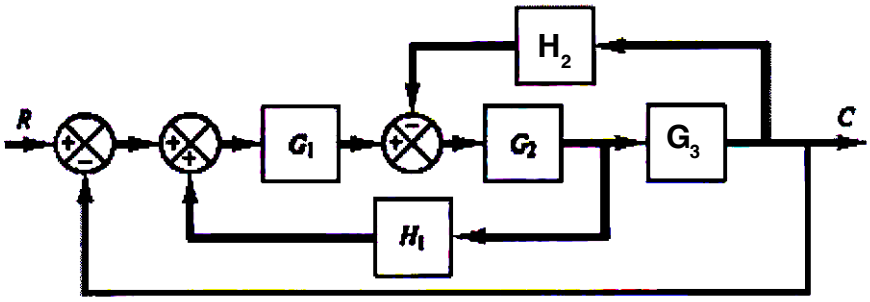

Fig.1

3. a) Explain hydraulic amplifier in detail and obtain its transfer function considering the effect of mass. **7**

b) For a electric shown in Fig. 2, find differential equation relating e_0 and e_1. **6**

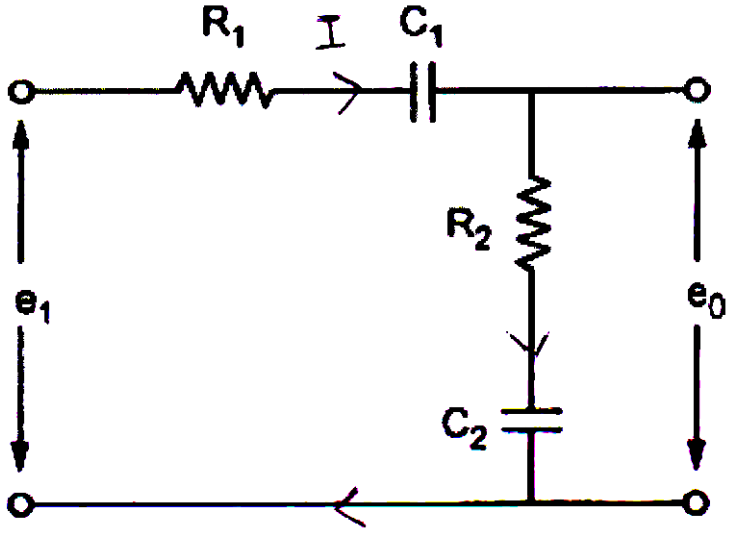

Fig. 2

Set Q

4. a) For a mechanical system shown in fig. 3 find the relation between : **7**

i) F and X ii) F and Y iii) X and Y.

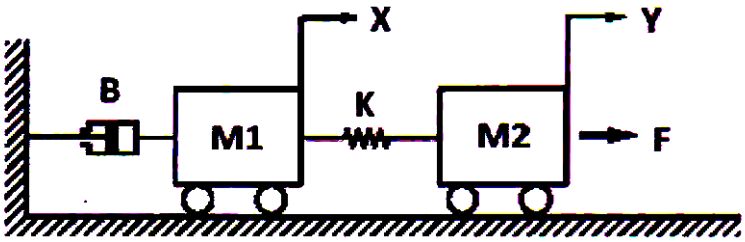

Fig.3

b) For a triangle 'X' is the length of base, 'Y' is the length of the side which is adjacent to the base and 'θ' is the angle between these two sides. The reference point values are $X_i = 10$, $Y_i = 16$ and $\theta_i = 30°$. Determine the linear approximation for area 'A'. Find the approximate area when X = 9, Y = 18, and $\theta = 33°$. (Refer Fig. 4). **6**

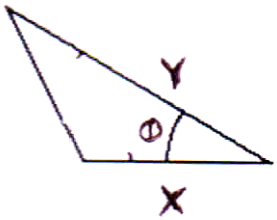

Fig. 4

5. a) Steady state operating curves for unity feedback system are shown in fig. 5. Using these curves find the steady state constants, draw steady state block diagram and also find the steady state relation of the system. ($M_i = 6$, $C_i = 400$). **7**

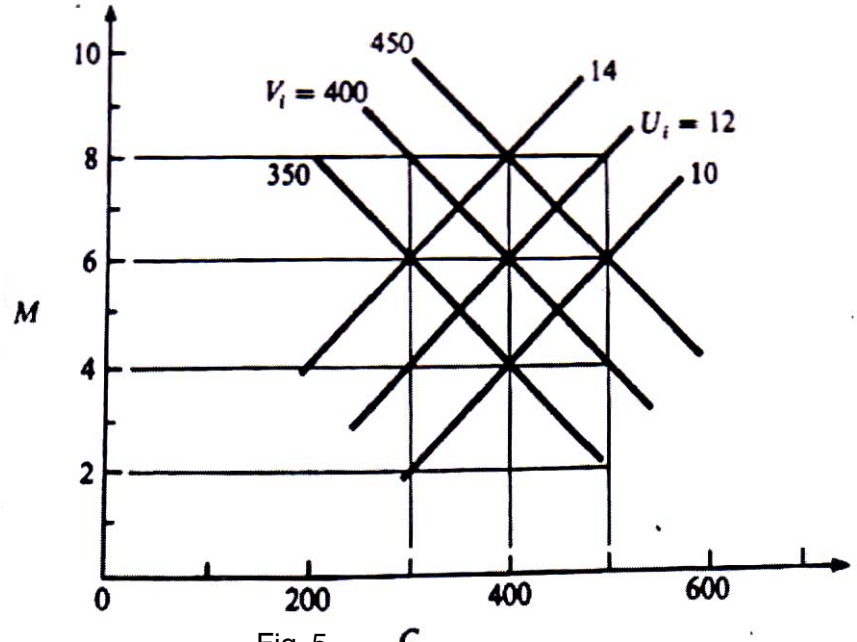

Fig. 5

Set Q

b) The characteristics of an engine are described by the family of curves shown in fig. 6. Determine the linear approximation for torque 't' delivered by the engine. The reference point is $N_i = 3000$, $Q_i = 50$. When torque 't' is greater than the load torque t_L, the excess torque $(t - t_L)$ is used to accelerate the engine so that $t - t_L = J \frac{dn}{dt}$. For J = 0.025 determine the differential equation relating change in speed to change in fuel flow and change in load.
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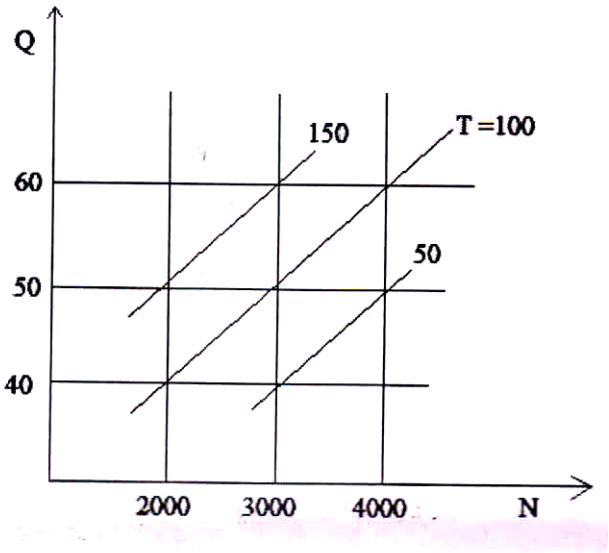

Fig.6

SECTION – II

6. a) Explain On Off control action in detail along with controller input and output curves for pure on off action and practical on off action. Also mention application and limitations of this mode. **7**

b) For a system shown in fig. 7, using Routh's stability criteria find the range of the gain for which system is stable. $G(S) = \frac{K}{s(s^2 + s + 1)(s + 2)}$. **6**

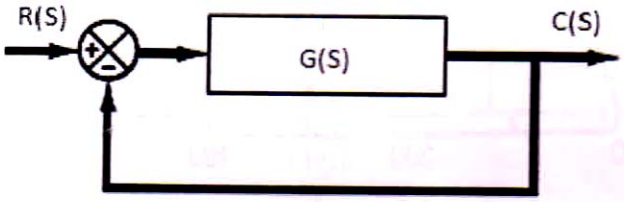

Fig.7

7. a) Derive the response equation of first order system subjected to unit step input. **5**

   b) For a unity feedback system, $G(S) = \frac{K(s+6)}{s(s+2)(s+3)}$. Construct the root locus for this system and comment on the stability of the system. **8**

8. a) Explain the term Break away point in relation with root locus. **5**

   b) For a unity feedback system, $G(S) = \frac{2000(s+1)}{s(s+10)(s+40)}$ .Draw the bode plot for this system and find GM, PM, ω_{gc} and ω_{pc} . Also comment on the stability of the system. **9**

9. a) Explain the bode plot for a simple pole in detail. (With equations, assumptions and respective plots). **5**

   b) Determine the state space representation for the feedback control system shown in fig. 8 using direct programming. Also construct the computer diagram for this system. $G(S) = \frac{2}{(D^2 + 7D + 10)}$. **8**

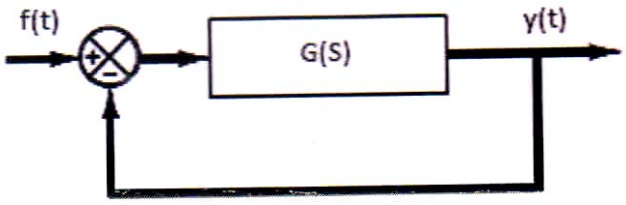

Fig.8

SLR-VB – 105

Seat No.	

Set **R**

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Friday, 5-5-2017 Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The transfer function of a system is given by $\frac{s^2 + 2s + 4}{s + 1}$. The system has ____ zeros.

a) simple b) complex c) repeated d) none of these

2) For a controller with integral action _____ behavior of the system will be better.

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4) Root locus for a system does not intersect with 'jw' axis (Imaginary axis). The system will be

a) Unstable b) Marginally stable

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5) The utility of the angle condition in root locus is _____

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c) to know the stability of the system

d) to check whether given point lies on root locus or not

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a) 1 b) 2 c) 3 d) 0

7) For a marginal stable system, this is true

a) GM and PM are positive b) GM and PM are negative

c) GM positive and PM negative d) GM = PM = 0

P.T.O.

8) For $0 < K < 1$, magnitude plot will be _____, K is gain of the system.
   a) Above 0 db line b) Below 0 db line
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   a) Pressure b) Mass of air
   c) Mass flow rate of air d) Volume flow rate of air

14) In direct analogy between electric and liquid level system, voltage is analogous to
   a) Liquid volume b) Liquid flow rate
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16) Speed of the armature controlled D.C. motor is controlled by
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   a) $C = G_1 * R_2 + G_2 * R_1$ b) $C = G_1/R_1 + G_2/R_2$
   c) $C = G_1 * R_1 + G_2 * R_2$ d) $C = R_1/G_1 + R_2/G_2$

19) For a control system, 'c', 'u' and 'v' denote change in output, change in disturbance and change in input respectively from operating point. With controller equation as $G_1(D) = K_1/D$, the steady state relation of the system will be
   a) c = v + u b) c = u c) c = v d) c = v – u

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   a) $G_1(D) = K_1/D$ b) $G_1(D) = K_1/(1 + 2 * D)$
   c) $G_1(D) = K_1 * D$ d) None of these

_____

SLR-VB – 105

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Friday, 5-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of non programmable calculator is **allowed**.*
*4) Assume any additional data **if necessary** and state **it clearly**.*
*5) **Use** university graph papers and semi log papers **if needed**.*

SECTION – I

2. a) Explain closed loop system in detail with basic block diagram. Give one example of a closed loop system along with block diagram. **7**

b) Find overall transfer function of a system represented by block diagram fig 1. **7**

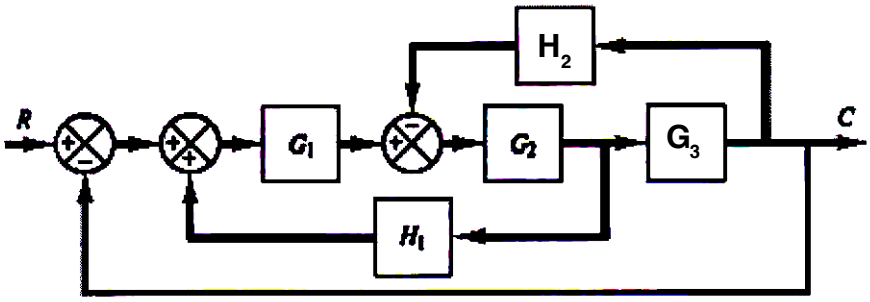

Fig.1

3. a) Explain hydraulic amplifier in detail and obtain its transfer function considering the effect of mass. **7**

b) For a electric shown in Fig. 2, find differential equation relating e_0 and e_1. **6**

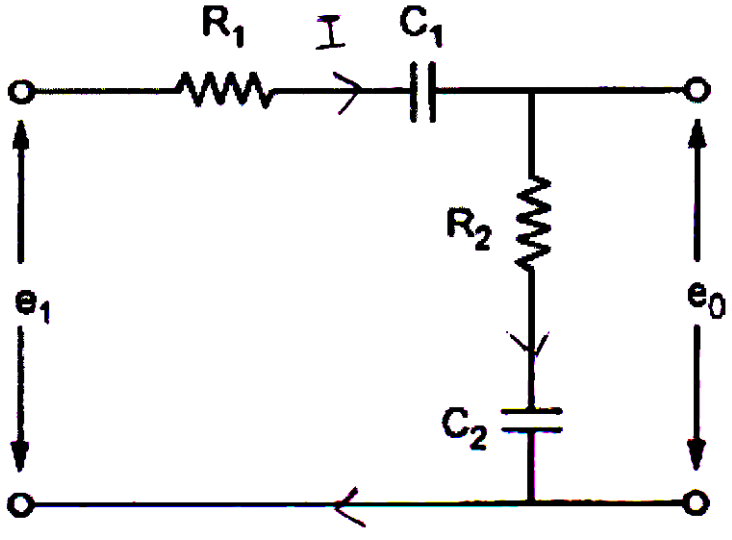

Fig. 2

Set R

4. a) For a mechanical system shown in fig. 3 find the relation between : **7**

i) F and X ii) F and Y iii) X and Y.

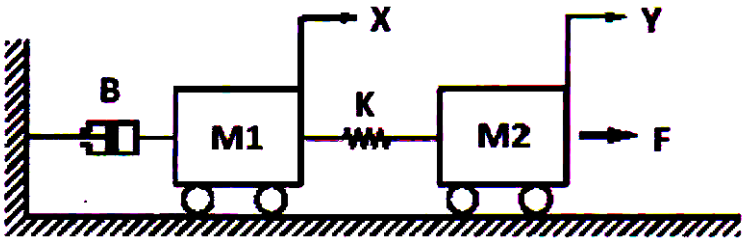

Fig.3

b) For a triangle 'X' is the length of base, 'Y' is the length of the side which is adjacent to the base and 'θ' is the angle between these two sides. The reference point values are $X_i = 10$, $Y_i = 16$ and $\theta_i = 30°$. Determine the linear approximation for area 'A'. Find the approximate area when X = 9, Y = 18, and $\theta = 33°$. (Refer Fig. 4). **6**

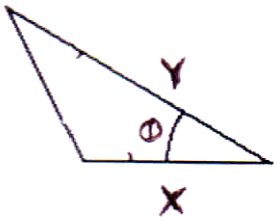

Fig. 4

5. a) Steady state operating curves for unity feedback system are shown in fig. 5. Using these curves find the steady state constants, draw steady state block diagram and also find the steady state relation of the system. ($M_i = 6$, $C_i = 400$). **7**

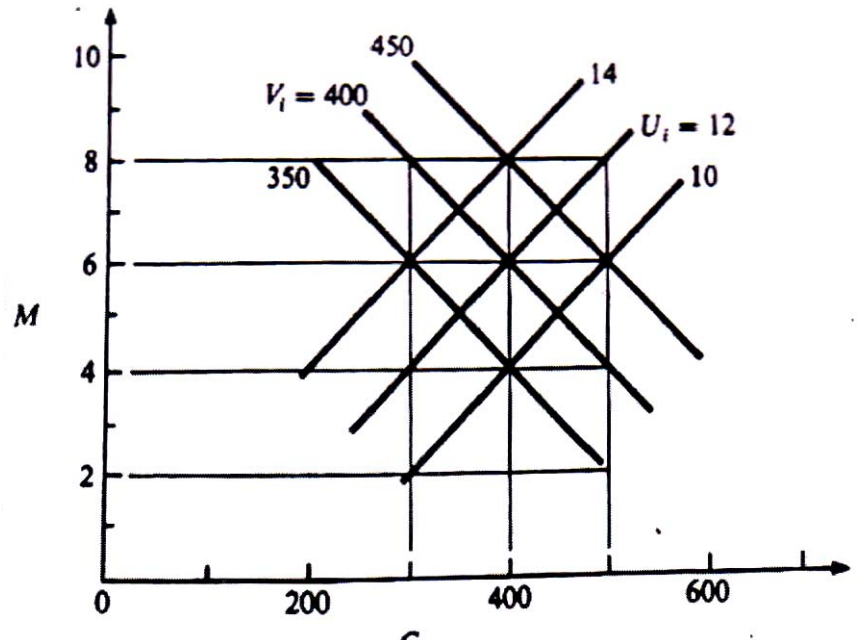

Fig. 5

Set R

b) The characteristics of an engine are described by the family of curves shown in fig. 6. Determine the linear approximation for torque 't' delivered by the engine. The reference point is $N_i = 3000$, $Q_i = 50$. When torque 't' is greater than the load torque t_L, the excess torque $(t - t_L)$ is used to accelerate the engine so that $t - t_L = J \frac{dn}{dt}$. For J = 0.025 determine the differential equation relating change in speed to change in fuel flow and change in load.
Aslo find the time constant of the system. **6**

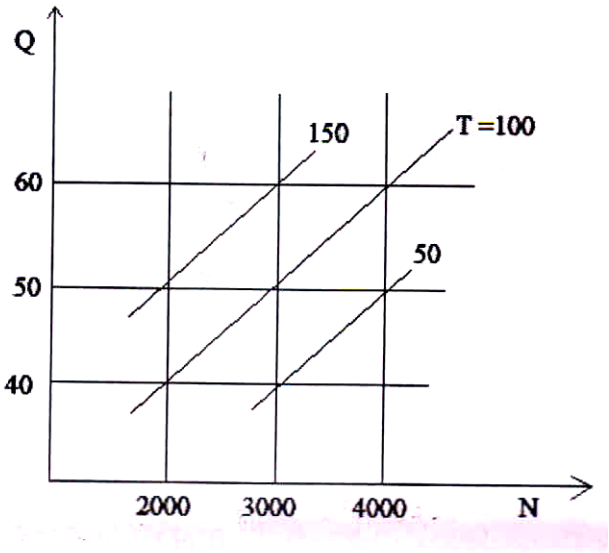

Fig.6

SECTION – II

6. a) Explain On Off control action in detail along with controller input and output curves for pure on off action and practical on off action. Also mention application and limitations of this mode. **7**

b) For a system shown in fig. 7, using Routh's stability criteria find the range of the gain for which system is stable. $G(S) = \frac{K}{s(s^2 + s + 1)(s + 2)}$. **6**

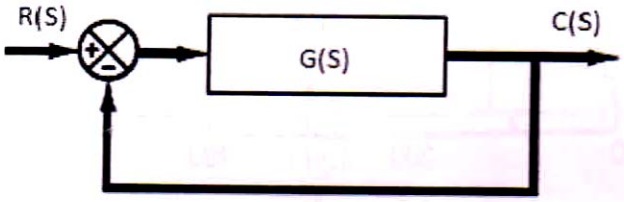

Fig.7

7. a) Derive the response equation of first order system subjected to unit step input. **5**

   b) For a unity feedback system, $G(S) = \frac{K(s+6)}{s(s+2)(s+3)}$. Construct the root locus for this system and comment on the stability of the system. **8**

8. a) Explain the term Break away point in relation with root locus. **5**

   b) For a unity feedback system, $G(S) = \frac{2000(s+1)}{s(s+10)(s+40)}$ .Draw the bode plot for this system and find GM, PM, ω_{gc} and ω_{pc} . Also comment on the stability of the system. **9**

9. a) Explain the bode plot for a simple pole in detail. (With equations, assumptions and respective plots). **5**

   b) Determine the state space representation for the feedback control system shown in fig. 8 using direct programming. Also construct the computer diagram for this system. $G(S) = \frac{2}{(D^2 + 7D + 10)}$. **8**

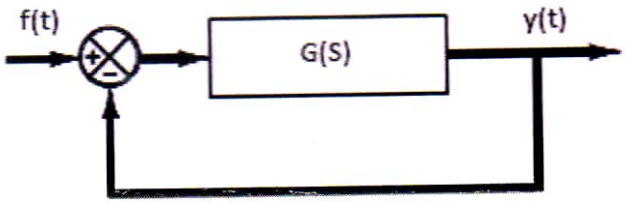

Fig.8

SLR-VB – 105

Seat No.	

Set S

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Friday, 5-5-2017 Max. Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*

*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Speed of the armature controlled D.C. motor is controlled by
a) Armature Voltage b) Field voltage c) Field Current d) None of these

2) Two components of a system are in parallel having transfer functions G_1 and G_2. This system can by replaced by equivalent system with transfer function
a) $G_1 * G_2$ b) $G_1 + G_2$ c) $G_1/(G_1-G_2)$ d) $G_1/(G_1+G_2)$

3) A linear system is subjected to two inputs R_1 and R_2, respective outputs are C_1 and C_2, G_1 is transfer functions between R_1 and C_1, G_2 is transfer function between R_2 and C_2. The overall output 'C' of the system is given by _____
a) $C = G_1 * R_2 + G_2 * R_1$ b) $C = G_1/R_1 + G_2/R_2$
c) $C = G_1 * R_1 + G_2 * R_2$ d) $C = R_1/G_1 + R_2/G_2$

4) For a control system, 'c', 'u' and 'v' denote change in output, change in disturbance and change in input respectively from operating point. With controller equation as $G_1(D) = K_1/D$, the steady state relation of the system will be
a) c = v + u b) c = u c) c = v d) c = v – u

5) The nature of the controller line will be vertical for a system with controller equation as
a) $G_1(D) = K_1/D$ b) $G_1(D) = K_1/(1 + 2 * D)$
c) $G_1(D) = K_1 * D$ d) None of these

6) The transfer function of a system is given by $\frac{s^2 + 2s + 4}{s + 1}$. The system has ____ zeros.
a) simple b) complex c) repeated d) none of these

7) For a controller with integral action _____ behavior of the system will be better.
a) Transient b) Steady state
c) Both a) and b) d) None of these

8) For P + I control action, in the beginning (t = 0) output of the controller will be dominated by _____ mode.
a) Proportional b) Integral c) Both a) and b) d) None of these

P.T.O.

9) Root locus for a system does not intersect with 'jw' axis (Imaginary axis). The system will be
   a) Unstable b) Marginally stable
   c) Stable for all gain values d) Conditionally stable

10) The utility of the angle condition in root locus is _____
   a) to know the phase angle
   b) to know the gain of the system
   c) to know the stability of the system
   d) to check whether given point lies on root locus or not

11) The transfer function of a system is given by, $\frac{s^2 + 2s + 4}{(s+1)(s+3)}$, _____ number of asymptotes is/are needed to draw the root locus.
   a) 1 b) 2 c) 3 d) 0

12) For a marginal stable system, this is true
   a) GM and PM are positive b) GM and PM are negative
   c) GM positive and PM negative d) GM = PM = 0

13) For 0 < K < 1, magnitude plot will be _____, K is gain of the system.
   a) Above 0 db line b) Below 0 db line
   c) 0 db line d) None of these

14) The contribution of one zero at the origin of the 'S' plane in a magnitude plot is a straight line with _____ slope and passing through the intersection of 0 db line and _____ line.
   a) 20 db/decade, ω = 10 rad/sec. b) – 20 db/decade, ω = 10 rad/sec.
   c) 20 db/decade, ω = 1 rad/sec. d) – 20 db/decade, ω = 1 rad/sec

15) State space model is
   a) Not unique for a system b) Suitable for non linear systems
   c) Both a) and b) d) None of these

16) Manual control system is
   a) Closed loop system b) Open loop system
   c) Hybrid system d) None of these

17) In a control system output of the controller is given to
   a) Comparator b) Final Control element
   c) System to be controlled d) Sensor

18) In direct analogy between electric and pneumatic system, current is analogous to
   a) Pressure b) Mass of air
   c) Mass flow rate of air d) Volume flow rate of air

19) In direct analogy between electric and liquid level system, voltage is analogous to
   a) Liquid volume b) Liquid flow rate
   c) Discharge through valve d) Head

20) In hydraulic servomotor _____ acts as a comparator.
   a) Walking Beam linkage b) Hydraulic Cylinder
   c) D.C. valve d) None of these

_____

SLR-VB – 105

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Friday, 5-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of non programmable calculator is **allowed**.*
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SECTION – I

2. a) Explain closed loop system in detail with basic block diagram. Give one example of a closed loop system along with block diagram. **7**

b) Find overall transfer function of a system represented by block diagram fig 1. **7**

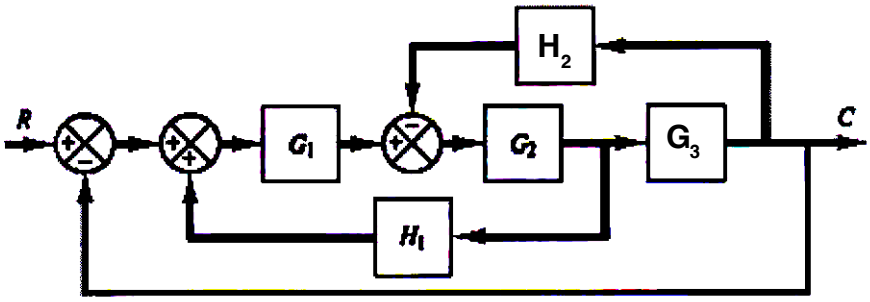

Fig.1

3. a) Explain hydraulic amplifier in detail and obtain its transfer function considering the effect of mass. **7**

b) For a electric shown in Fig. 2, find differential equation relating e_0 and e_1. **6**

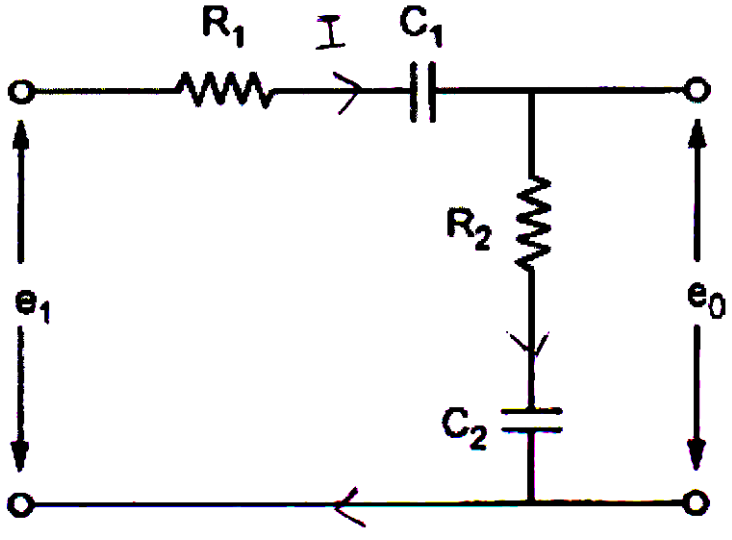

Fig. 2

Set S

4. a) For a mechanical system shown in fig. 3 find the relation between : **7**

i) F and X ii) F and Y iii) X and Y.

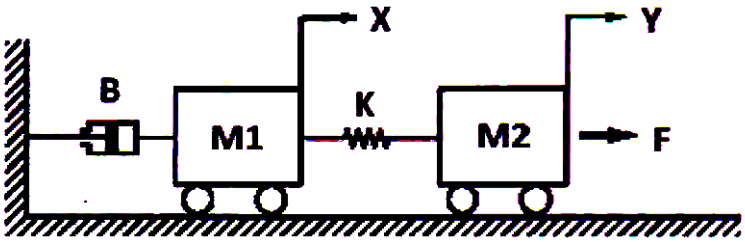

Fig.3

b) For a triangle 'X' is the length of base, 'Y' is the length of the side which is adjacent to the base and 'θ' is the angle between these two sides. The reference point values are $X_i = 10$, $Y_i = 16$ and $\theta_i = 30°$. Determine the linear approximation for area 'A'. Find the approximate area when X = 9, Y = 18, and $\theta = 33°$. (Refer Fig. 4). **6**

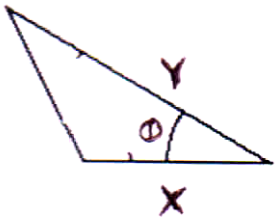

Fig. 4

5. a) Steady state operating curves for unity feedback system are shown in fig. 5. Using these curves find the steady state constants, draw steady state block diagram and also find the steady state relation of the system. ($M_i = 6$, $C_i = 400$). **7**

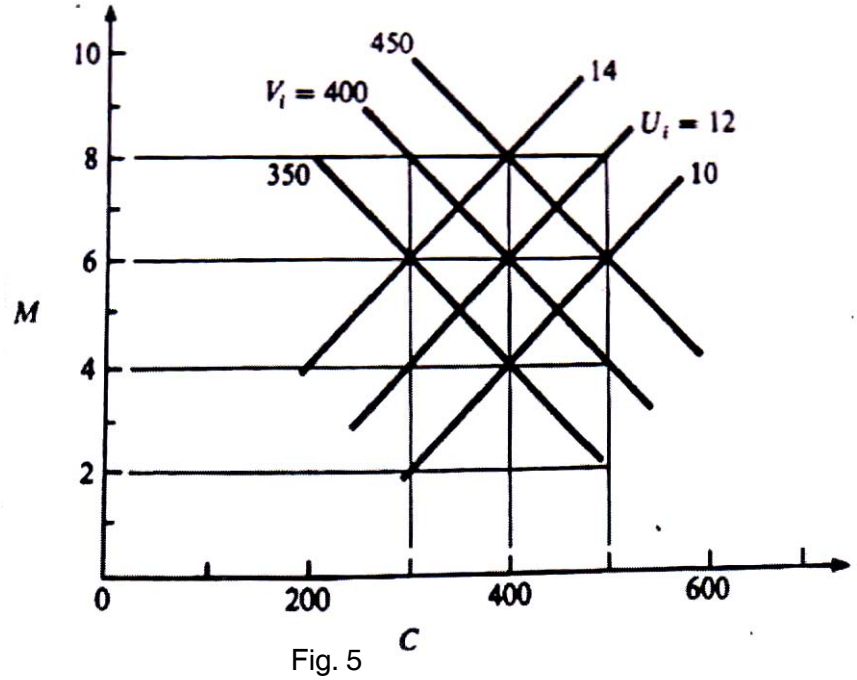

Fig. 5

Set S

b) The characteristics of an engine are described by the family of curves shown in fig. 6. Determine the linear approximation for torque 't' delivered by the engine. The reference point is $N_i = 3000$, $Q_i = 50$. When torque 't' is greater than the load torque t_L, the excess torque $(t - t_L)$ is used to accelerate the engine so that $t - t_L = J \frac{dn}{dt}$. For J = 0.025 determine the differential equation relating change in speed to change in fuel flow and change in load.
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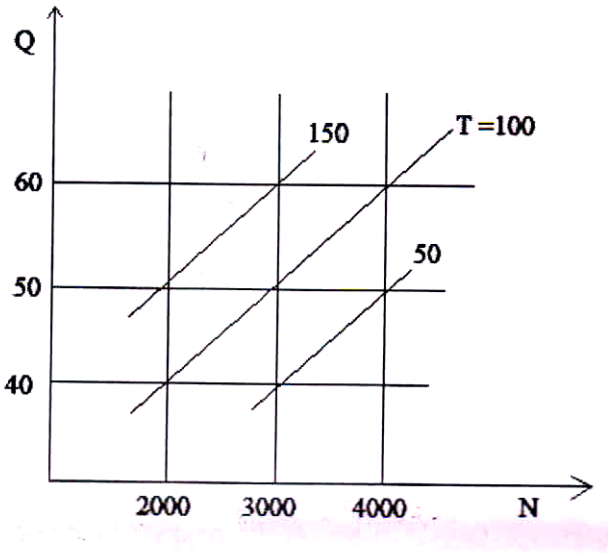

Fig.6

SECTION – II

6. a) Explain On Off control action in detail along with controller input and output curves for pure on off action and practical on off action. Also mention application and limitations of this mode. **7**

b) For a system shown in fig. 7, using Routh's stability criteria find the range of the gain for which system is stable. $G(S) = \frac{K}{s(s^2 + s + 1)(s + 2)}$. **6**

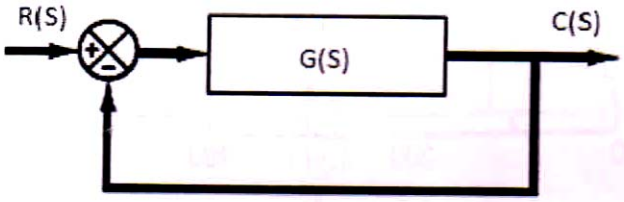

Fig.7

7. a) Derive the response equation of first order system subjected to unit step input. **5**

   b) For a unity feedback system, $G(S) = \frac{K(s+6)}{s(s+2)(s+3)}$. Construct the root locus for this system and comment on the stability of the system. **8**

8. a) Explain the term Break away point in relation with root locus. **5**

   b) For a unity feedback system, $G(S) = \frac{2000(s+1)}{s(s+10)(s+40)}$ .Draw the bode plot for this system and find GM, PM, ω_{gc} and ω_{pc} . Also comment on the stability of the system. **9**

9. a) Explain the bode plot for a simple pole in detail. (With equations, assumptions and respective plots). **5**

   b) Determine the state space representation for the feedback control system shown in fig. 8 using direct programming. Also construct the computer diagram for this system. $G(S) = \frac{2}{(D^2 + 7D + 10)}$. **8**

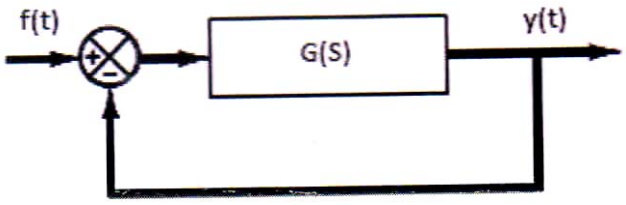

Fig.8

SLR-VB – 105

Seat No.	

Set **P**

B.E. (Mechanical) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Thursday, 4-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Answer cannot be changed ***once*** *it is marked.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) A rider riding a bike is an example of
   a) Manual open loop system b) Manual closed loop system
   c) Automatic open loop system d) Automatic closed loop system

2) The signal at the output of a comparator is often known as
   a) Reference input signal b) System output signal
   c) Error signal d) Disturbance signal

3) In the inverse analog for a mechanical system, the quantity which cannot be compared with any electrical quantity is
   a) Velocity b) Force
   c) Damping coefficient d) Displacement

4) The impedance term for a capacitor is given by
   a) 1/CD b) CD c) C d) 1/C

5) A hydraulic amplifier amplifies
   a) Displacement b) Torque c) Force d) Speed

6) In linearization of operating curves, the partial derivatives are
   a) Calculated from a graph b) Calculated from an equation
   c) Impossible to find d) Not at all required

7) In block diagram algebra, parallel blocks are
   a) Divided b) Integrated
   c) Multiplied d) Added or subtracted

8) The closed loop transfer function for a system with positive feedback is given by

   a) $\frac{G(S)}{1+G(S)H(S)}$ b) $\frac{G(S)}{1-G(S)H(S)}$ c) $\frac{H(S)}{1+G(S)H(S)}$ d) $\frac{H(S)}{1-G(S)H(S)}$

P.T.O.

9) In load line plots, $(\partial U/\partial C)_M$ indicates
   a) Slope
   b) Horizontal spacing
   c) Vertical spacing
   d) Perpendicular distance

10) Slope of controller lines is given by
   a) $1/K_{G2}$
   b) K_H/A
   c) $1/AK_{G1}$
   d) $-K_{G1}K_H$

11) If any row in Routh's array has all zero coefficients, the system
   a) Has two roots symmetric about the origin
   b) Is stable
   c) Has two roots in the right half plane
   d) Is oscillatory

12) 'Integral Time' in terms of ratio of gain constants is given by
   a) K_d/K_i
   b) K_i/K_p
   c) K_p/K_i
   d) None of these

13) 'Reset action' is another name for
   a) D-action
   b) P-action
   c) ON/OFF action
   d) I-action

14) 'Centroid' of asymptotes is a point which
   a) May be real or complex
   b) Is real but may or may not lie on the root locus
   c) Is real and always lies on the root locus
   d) Is always imaginary

15) A root locus is always
   a) Symmetric about the real axis
   b) Symmetric about the imaginary axis
   c) Symmetric about the origin
   d) In the left half plane

16) A root locus has any branches originating from infinity when
   a) $P = Z$
   b) $P > Z$
   c) $Z > P$
   d) $Z = 0$

17) 'Phase Margin' is always calculated at
   a) Corner frequency
   b) Phase cross-over frequency
   c) Gain cross-over frequency
   d) Highest magnitude

18) The frequency at which the magnitude of closed loop response drops by 3 db from its zero frequency value is known as
   a) Gain cross-over frequency
   b) Cut-off frequency
   c) Corner frequency
   d) Phase cross-over frequency

19) For a marginally stable system
   a) G.M. and P.M. are zero
   b) G.M. and P.M. are positive
   c) G.M. and P.M. are negative
   d) G.M. and P.M. are infinity

20) The next state variable is always a derivative of the previous state variable in case of
   a) Parallel programming
   b) Series programming
   c) General programming
   d) Direct programming

SLR-VB – 105

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Thursday, 4-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Solve **any three** questions from **each** Section.*
*2) **Use** of scientific **calculator** is allowed.*
*3) Figures to **right** indicate **full** marks.*
*4) Assume additional suitable data **if necessary** and state its clearly.*
*5) **Use** university graph paper and semi-log paper **if required**.*

SECTION – I

2. a) Distinguish between open loop and closed loop control systems. **5**

b) For the lever system as shown in fig. (2-b), determine the relations between
i) f and x
ii) T and θ where, T = Torque applied and θ = Angle of deflection in radians. **8**

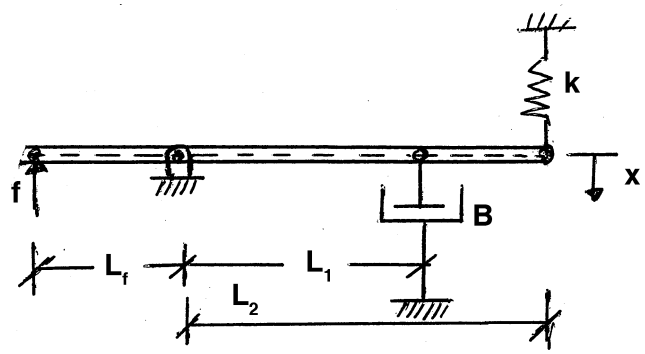

Fig. (2-b)

3. a) For a system as shown in fig. (3-a), drawn the grounded chair representation and obtain the relation between f and x. **6**

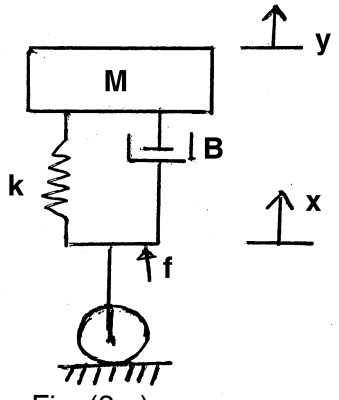

Fig. (3-a)

Set P

b) According to the cosine rule applied to the triangle as shown in fig. (3-b),

$C^2 = A^2 + B^2 - 2AB\cos\alpha$. Effect a linear approximation to calculate the length of side C.

If $A_i = 8$, $B_i = 12$, $\alpha_i = 120^\circ$ and $A = 9$, $B = 14$, $\alpha = 123^\circ$ determine the percentage error in calculating the length of side C. **7**

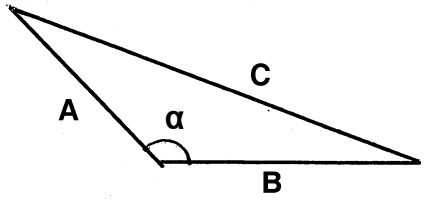

Fig. (3-b)

4. a) For the block diagram of a feedback control system as shown in fig. (4-a), obtain the closed loop transfer function C(S)/R(S). **7**

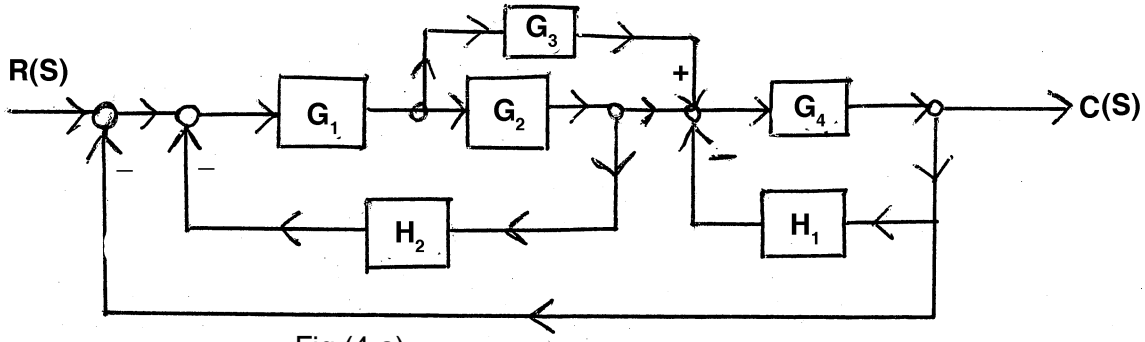

Fig.(4-a)

b) Explain working of a 'Jet Pipe Amplifier' and obtain its block diagram. **6**

5. a) For a control system represented by the block diagram in fig. (5-a), at the reference operating point, $V_i = C_i = 100$ and $M_i = 25$. Sketch the controller lines on M vs. C Plot. Draw the three lines for V = 100, V = 110 and V = 90 by clearly obtaining the co-ordinates of two points on every line using partial derivatives. **8**

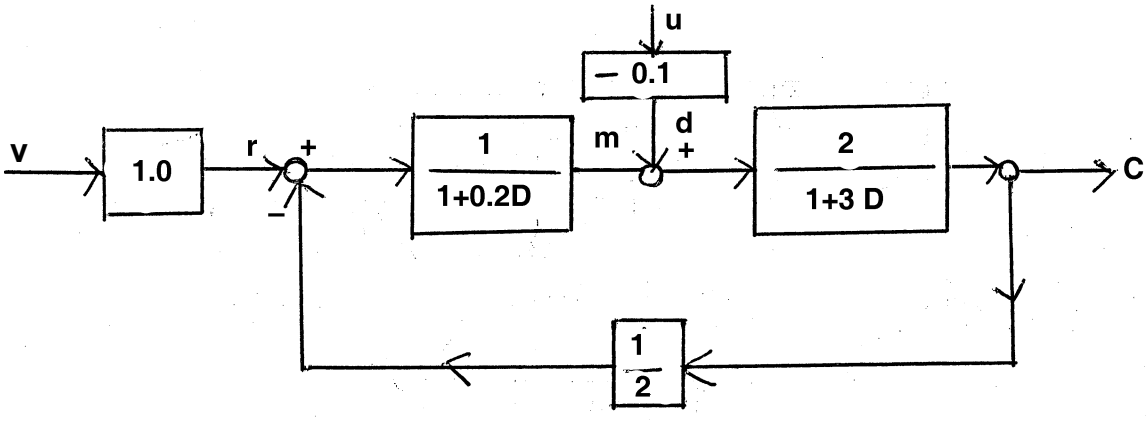

Fig. (5-a)

b) Write a note on 'Modern Control Systems'. **5**

Set P

SECTION – II

6. a) Find the range of K so that the system given by the following characteristic equation will be stable. $S(S^2 + S + 1)(S + 4) + K = 0$. **7**

   b) For a feedback control system given by, $G(S)H(S) = \dfrac{K}{S(S+2)(S+4)}$ using 'Angle Condition', check whether the point $S = -0.75$ is on the Root Locus or not. Determine the value of K using 'Magnitude Condition' if it lies on the Root Locus. **6**

7. a) For a control system represented by, $G(S)H(S) = \dfrac{K(S+4)}{(S+2)(S+3)}$. Sketch the complete Root Locus and comment on the system stability. **8**

   b) Discuss the advantages and limitations of P – action, I – action, D – action and (P+I+D) – action. **5**

8. a) For a unity feedback system given by,

$$G(S) = \frac{800(S+2)}{S^2(S+10)(S+40)}$$

   sketch the Bode Plots and comment on the system stability. **10**

   b) Explain the following terms : **4**

      i) Integral time ii) Derivative time.

9. a) Obtain State-Space representation using 'Direct Programming' and also draw the 'Computer diagram' for a feedback control system given by,

$$Y(t) = \frac{D+4}{(D+1)(D+2)(D+3)} f(t)$$ **9**

   b) Define the following terms in Bode Plots. **4**

      i) Gain Margin

      ii) Phase Margin

      iii) Gain cross-over frequency

      iv) Phase cross-over frequency.

Set P

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Seat No.	

Set **Q**

B.E. (Mechanical) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Thursday, 4-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Answer cannot be changed ***once*** *it is marked.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) A root locus has any branches originating from infinity when
a) P = Z b) P > Z c) Z > P d) Z = 0

2) 'Phase Margin' is always calculated at
a) Corner frequency b) Phase cross-over frequency
c) Gain cross-over frequency d) Highest magnitude

3) The frequency at which the magnitude of closed loop response drops by 3 db from its zero frequency value is known as
a) Gain cross-over frequency b) Cut-off frequency
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4) For a marginally stable system
a) G.M. and P.M. are zero b) G.M. and P.M. are positive
c) G.M. and P.M. are negative d) G.M. and P.M. are infinity

5) The next state variable is always a derivative of the previous state variable in case of
a) Parallel programming b) Series programming
c) General programming d) Direct programming

6) A rider riding a bike is an example of
a) Manual open loop system b) Manual closed loop system
c) Automatic open loop system d) Automatic closed loop system

7) The signal at the output of a comparator is often known as
a) Reference input signal b) System output signal
c) Error signal d) Disturbance signal

8) In the inverse analog for a mechanical system, the quantity which cannot be compared with any electrical quantity is
a) Velocity b) Force
c) Damping coefficient d) Displacement

9) The impedance term for a capacitor is given by
a) 1/CD b) CD c) C d) 1/C

P.T.O.

10) A hydraulic amplifier amplifies
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11) In linearization of operating curves, the partial derivatives are
a) Calculated from a graph b) Calculated from an equation
c) Impossible to find d) Not at all required

12) In block diagram algebra, parallel blocks are
a) Divided b) Integrated
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13) The closed loop transfer function for a system with positive feedback is given by
a) $\frac{G(S)}{1+G(S)H(S)}$ b) $\frac{G(S)}{1-G(S)H(S)}$ c) $\frac{H(S)}{1+G(S)H(S)}$ d) $\frac{H(S)}{1-G(S)H(S)}$

14) In load line plots, $(\partial U/\partial C)_M$ indicates
a) Slope b) Horizontal spacing
c) Vertical spacing d) Perpendicular distance

15) Slope of controller lines is given by
a) $1/K_{G2}$ b) K_H/A c) $1/AK_{G1}$ d) $-K_{G1}K_H$

16) If any row in Routh's array has all zero coefficients, the system
a) Has two roots symmetric about the origin
b) Is stable
c) Has two roots in the right half plane
d) Is oscillatory

17) 'Integral Time' in terms of ratio of gain constants is given by
a) K_d/K_i b) K_i/K_p c) K_p/K_i d) None of these

18) 'Reset action' is another name for
a) D-action b) P-action c) ON/OFF action d) I-action

19) 'Centroid' of asymptotes is a point which
a) May be real or complex
b) Is real but may or may not lie on the root locus
c) Is real and always lies on the root locus
d) Is always imaginary

20) A root locus is always
a) Symmetric about the real axis b) Symmetric about the imaginary axis
c) Symmetric about the origin d) In the left half plane

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Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Thursday, 4-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

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*4) Assume additional suitable data **if necessary** and state its clearly.*
*5) **Use** university graph paper and semi-log paper **if required**.*

SECTION – I

2. a) Distinguish between open loop and closed loop control systems. **5**

b) For the lever system as shown in fig. (2-b), determine the relations between
i) f and x
ii) T and θ where, T = Torque applied and θ = Angle of deflection in radians. **8**

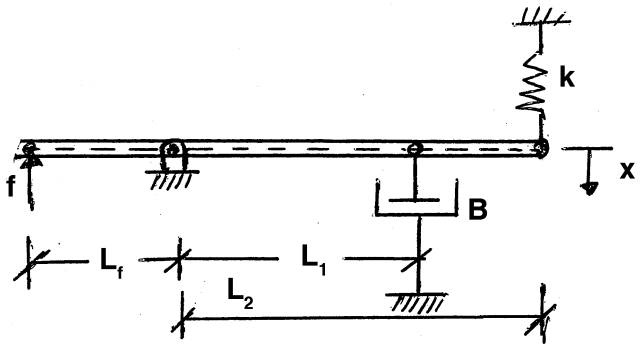


Fig. (2-b)

3. a) For a system as shown in fig. (3-a), drawn the grounded chair representation and obtain the relation between f and x. **6**

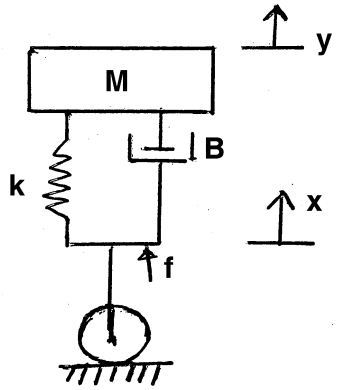


Fig. (3-a)

Set Q

b) According to the cosine rule applied to the triangle as shown in fig. (3-b),

$C^2 = A^2 + B^2 - 2AB\cos\alpha$. Effect a linear approximation to calculate the length of side C.

If $A_i = 8$, $B_i = 12$, $\alpha_i = 120^\circ$ and $A = 9$, $B = 14$, $\alpha = 123^\circ$ determine the percentage error in calculating the length of side C. **7**

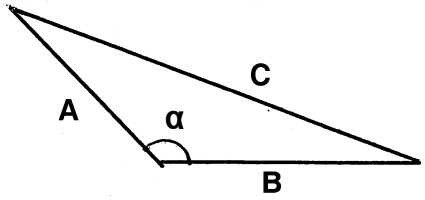
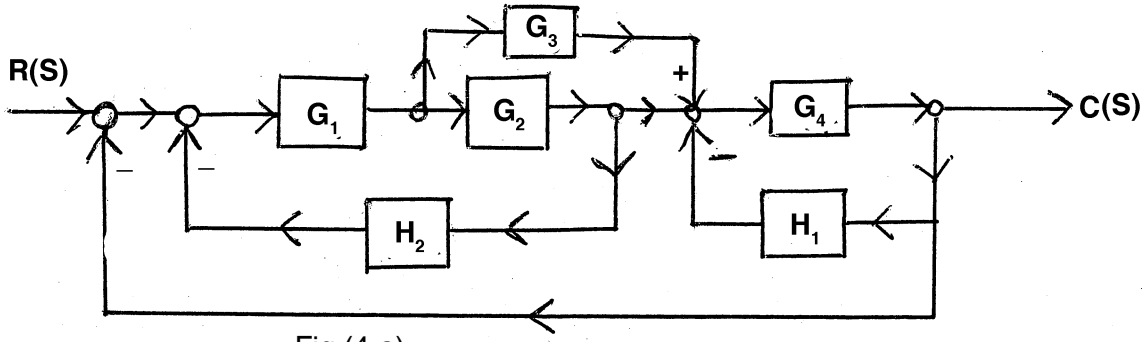


Fig. (3-b)

4. a) For the block diagram of a feedback control system as shown in fig. (4-a), obtain the closed loop transfer function C(S)/R(S). **7**



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5. a) For a control system represented by the block diagram in fig. (5-a), at the reference operating point, $V_i = C_i = 100$ and $M_i = 25$. Sketch the controller lines on M vs. C Plot. Draw the three lines for V = 100, V = 110 and V = 90 by clearly obtaining the co-ordinates of two points on every line using partial derivatives. **8**

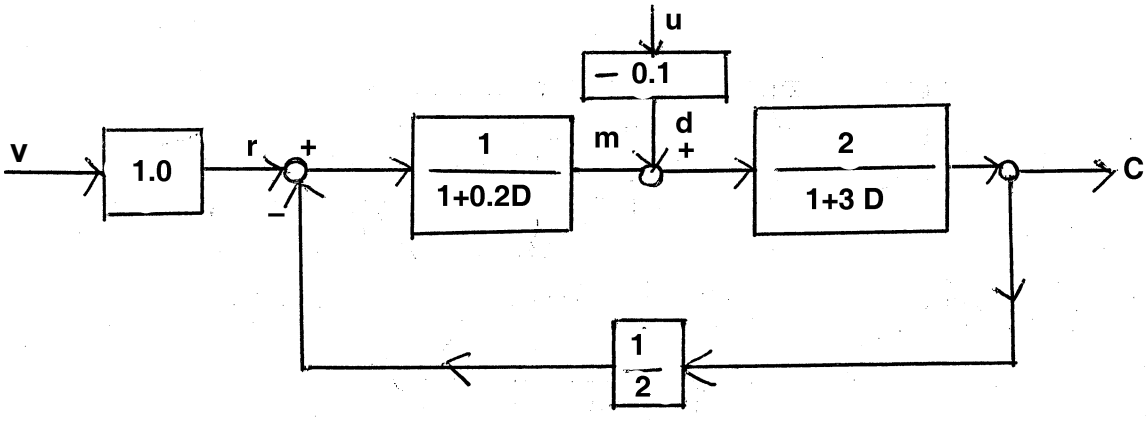

Fig. (5-a)

b) Write a note on 'Modern Control Systems'. **5**

Set Q

SECTION – II

6. a) Find the range of K so that the system given by the following characteristic equation will be stable. $S(S^2 + S + 1)(S + 4) + K = 0$. **7**

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$$Y(t) = \frac{D+4}{(D+1)(D+2)(D+3)} f(t)$$ **9**

   b) Define the following terms in Bode Plots. **4**

      i) Gain Margin

      ii) Phase Margin

      iii) Gain cross-over frequency

      iv) Phase cross-over frequency.

Set Q

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Seat No.	

Set **R**

B.E. (Mechanical) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Thursday, 4-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) If any row in Routh's array has all zero coefficients, the system
   a) Has two roots symmetric about the origin
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2) 'Integral Time' in terms of ratio of gain constants is given by
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P.T.O.

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19) In load line plots, $(\partial U/\partial C)_M$ indicates
   a) Slope
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20) Slope of controller lines is given by
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SLR-VB – 105

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Thursday, 4-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

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SECTION – I

2. a) Distinguish between open loop and closed loop control systems. **5**

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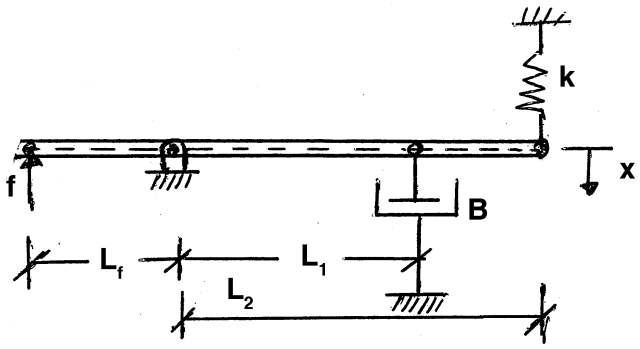

Fig. (2-b)

3. a) For a system as shown in fig. (3-a), drawn the grounded chair representation and obtain the relation between f and x. **6**

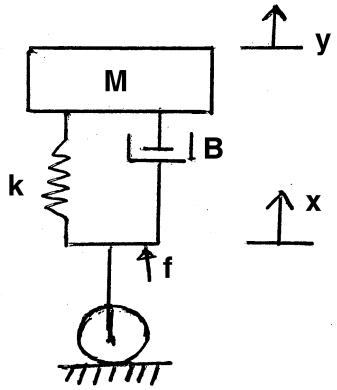

Fig. (3-a)

Set R

b) According to the cosine rule applied to the triangle as shown in fig. (3-b),

$C^2 = A^2 + B^2 - 2AB\cos\alpha$. Effect a linear approximation to calculate the length of side C.

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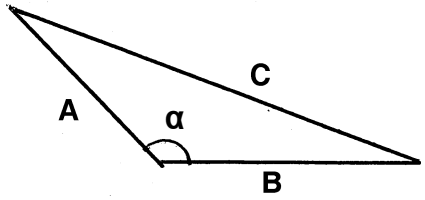

Fig. (3-b)

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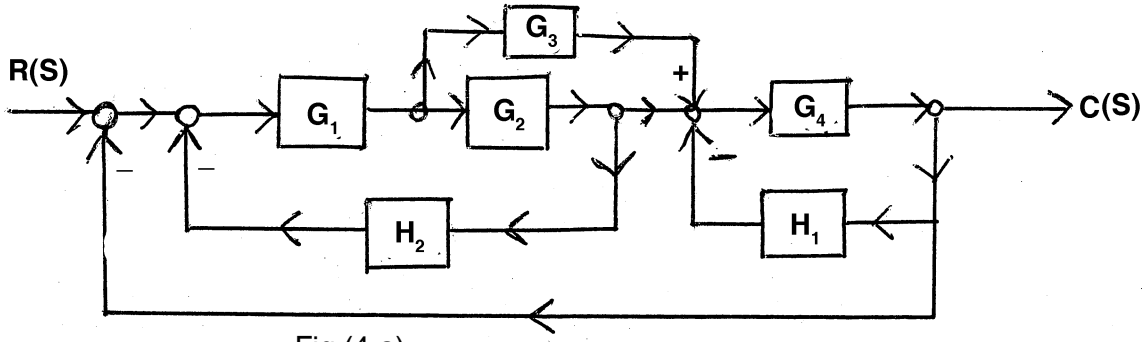

Fig.(4-a)

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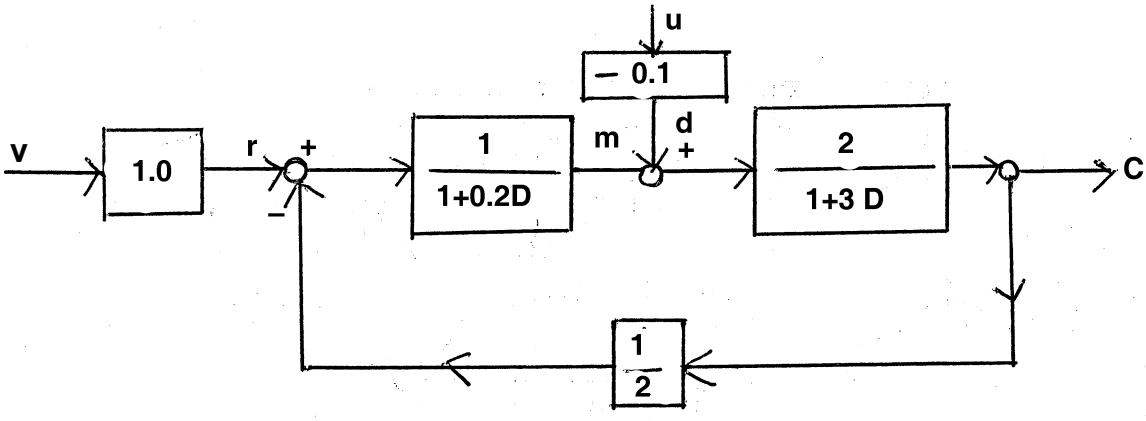

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Set R

SECTION – II

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   b) Define the following terms in Bode Plots. **4**

      i) Gain Margin

      ii) Phase Margin

      iii) Gain cross-over frequency

      iv) Phase cross-over frequency.

SLR-VB – 105

Seat No.	

Set **S**

B.E. (Mechanical) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Thursday, 4-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

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MCQ/Objective Type Questions

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P.T.O.

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SLR-VB – 105

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
AUTOMATIC CONTROL ENGINEERING

Day and Date : Thursday, 4-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Solve **any three** questions from **each** Section.*
*2) **Use** of scientific **calculator** is allowed.*
*3) Figures to **right** indicate **full** marks.*
*4) Assume additional suitable data **if necessary** and state its clearly.*
*5) **Use** university graph paper and semi-log paper **if required**.*

SECTION – I

2. a) Distinguish between open loop and closed loop control systems. **5**

b) For the lever system as shown in fig. (2-b), determine the relations between
i) f and x
ii) T and θ where, T = Torque applied and θ = Angle of deflection in radians. **8**

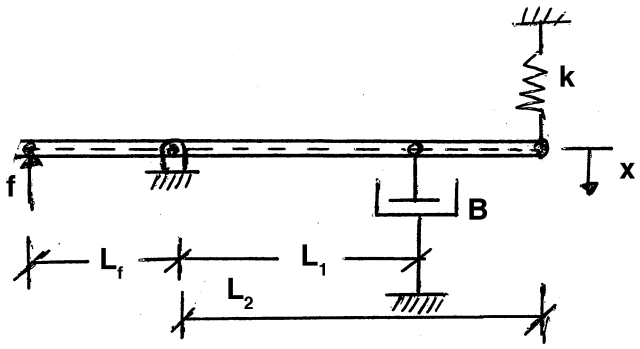

Fig. (2-b)

3. a) For a system as shown in fig. (3-a), drawn the grounded chair representation and obtain the relation between f and x. **6**

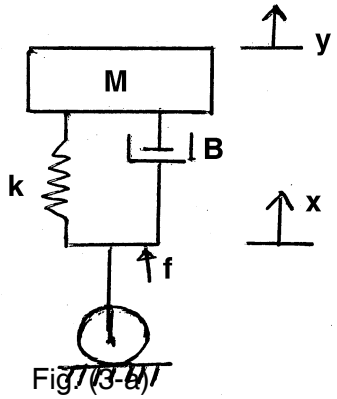

Fig. (3-a)

b) According to the cosine rule applied to the triangle as shown in fig. (3-b),

$C^2 = A^2 + B^2 - 2AB\cos\alpha$. Effect a linear approximation to calculate the length of side C.

If $A_i = 8$, $B_i = 12$, $\alpha_i = 120^\circ$ and $A = 9$, $B = 14$, $\alpha = 123^\circ$ determine the percentage error in calculating the length of side C. **7**

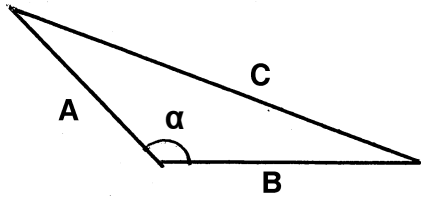

Fig. (3-b)

4. a) For the block diagram of a feedback control system as shown in fig. (4-a), obtain the closed loop transfer function C(S)/R(S). **7**

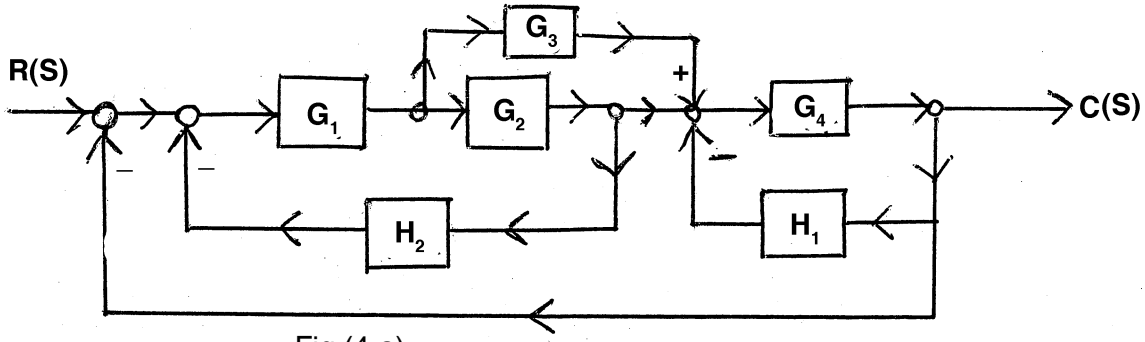

Fig.(4-a)

b) Explain working of a 'Jet Pipe Amplifier' and obtain its block diagram. **6**

5. a) For a control system represented by the block diagram in fig. (5-a), at the reference operating point, $V_i = C_i = 100$ and $M_i = 25$. Sketch the controller lines on M vs. C Plot. Draw the three lines for V = 100, V = 110 and V = 90 by clearly obtaining the co-ordinates of two points on every line using partial derivatives. **8**

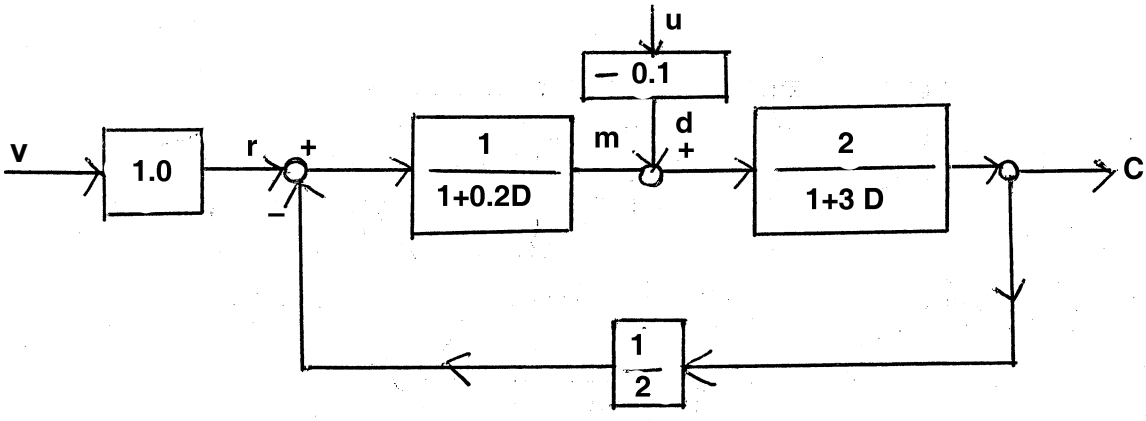

Fig. (5-a)

b) Write a note on 'Modern Control Systems'. **5**

Set S

SECTION – II

6. a) Find the range of K so that the system given by the following characteristic equation will be stable. $S(S^2 + S + 1)(S + 4) + K = 0$. **7**

   b) For a feedback control system given by, $G(S)H(S) = \dfrac{K}{S(S+2)(S+4)}$ using 'Angle Condition', check whether the point $S = -0.75$ is on the Root Locus or not. Determine the value of K using 'Magnitude Condition' if it lies on the Root Locus. **6**

7. a) For a control system represented by, $G(S)H(S) = \dfrac{K(S+4)}{(S+2)(S+3)}$. Sketch the complete Root Locus and comment on the system stability. **8**

   b) Discuss the advantages and limitations of P – action, I – action, D – action and (P+I+D) – action. **5**

8. a) For a unity feedback system given by,

$$G(S) = \frac{800(S+2)}{S^2(S+10)(S+40)}$$

   sketch the Bode Plots and comment on the system stability. **10**

   b) Explain the following terms : **4**

      i) Integral time ii) Derivative time.

9. a) Obtain State-Space representation using 'Direct Programming' and also draw the 'Computer diagram' for a feedback control system given by,

$$Y(t) = \frac{D+4}{(D+1)(D+2)(D+3)} f(t)$$ **9**

   b) Define the following terms in Bode Plots. **4**

      i) Gain Margin

      ii) Phase Margin

      iii) Gain cross-over frequency

      iv) Phase cross-over frequency.

Set S

SLR-VB – 107

Seat No.	

Set **P**

B.E. (Mechanical) (Part – I) Examination, 2017
REFRIGERATION AND AIR CONDITIONING

Day and Date : Saturday, 6-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*
*3) Attempt **any two** questions from **each** Section.*
*4) Use of non-programmable calculator, steam table, Psychometric chart are **allowed**.*
*5) Assume suitable data **wherever** necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) A reversible Carnot cycle used for refrigeration comprises
   a) Two isentropic and two adiabatic processes
   b) Two isentropic and two constant volume processes
   c) Two isentropic and two constant pressure process
   d) Two isentropic and two isothermal processes

2) When water intercooling is used in multi-stage compression, it
   a) Reduces the work to be done in high pressure compressor
   b) Reduces the specific volume of refrigerant
   c) Requires a compressor of less stroke volume
   d) All of the above

3) The Freon group of refrigerants are also called as
   a) Halo-carbon refrigerants b) Azeotrope refrigerants
   c) Inorganic refrigerants d) Hydro-carbon refrigerants

4) In a three fluid vapour absorption refrigeration system, the hydrogen gas is used to
   a) Improve system performance
   b) Reduce the partial pressure of refrigerant in evaporator
   c) Circulate the refrigerant
   d) Provide a vapour seal

5) The sub-cooling in VCC system is used
   a) Before compression b) Before throttling
   c) After compression d) After throttling

6) CFC based refrigerants are being replaced as they are found to
   a) Cause ozone layer depletion
   b) Consume more energy
   c) React with several materials of construction
   d) Expensive

7) In aqua-ammonia and Lithium-bromide water absorption refrigeration systems, the refrigerants are respectively
   a) Water and water
   b) Water and lithium bromide
   c) Ammonia and lithium bromide
   d) Ammonia and water

8) A boot-strap air cooling system has
   a) One heat exchanger
   b) Two heat exchanger
   c) Three heat exchanger
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9) Use of flash tank helps
   a) Flash gas formed during expansion can be removed at an intermediate pressure
   b) Temperature of refrigerant vapour at the inlet to higher stage compressor can be reduced
   c) Pressure drop in evaporator can be reduced
   d) All of above

10) For ammonia refrigerating systems, the tubes of a shell and tube condenser are made of
   a) Copper b) Aluminium c) Steel d) Brass

11) The value of degree of saturation for Saturated Air is
   a) 0.1 b) 0 c) 0.5 d) 1

12) The conditioned air supplied to the room must have the capacity to take up
   a) Room sensible heat load only
   b) Room latent heat load only
   c) Both room sensible heat and latent heat loads
   d) None of the above

13) If relative humidity is 100%, then
   a) DBT is greater than WBT
   b) DBT is less than WBT
   c) DBT is equal to WBT
   d) DBT is less than DPT

14) In a psychrometric process, the sensible heat added is 30 kJ/sand the latent heat added is 20 kJ/s. The sensible heat factor for the process will be
   a) 0.3 b) 0.67 c) 0.6 d) 1.5

15) The alignment circle is marked on the psychrometric chart at
   a) 20°C *DBT* and 50% *RH*
   b) 26°C *DBT* and 50% *RH*
   c) 20°C *DBT* and 60% *RH*
   d) 26°C *DBT* and 60% *RH*

16) Human beings need air conditioning as
   a) They continuously dissipate heat due to metabolic activity
   b) Body regulatory mechanisms need stable internal temperatures
   c) Efficiency improves under controlled conditions
   d) All of the above

17) Equivalent length (Le) for calculation of dynamic pressure loss is given by equation

   a) $\frac{f}{Cm}$ b) $\frac{fC}{m}$ c) $\frac{fm}{C}$ d) $\frac{Cm}{f}$

18) For rectangular duct, the aspect ratio is equal to
   a) Sum of longer and shorter side
   b) Difference of longer and shorter side
   c) Product of longer and shorter side
   d) Ratio of longer to shorter side

19) Linde system for liquefaction of air is also known as
   a) Claude system b) Cascade system c) Hampson system d) Carnot system

20) During Sensible Cooling of air, the wet bulb temperature
   a) Increases b) Decrease c) Remains same d) Can't predict

SLR-VB – 107

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
REFRIGERATION AND AIR CONDITIONING

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Instructions *: 1) Attempt **any two** questions from **each** Section.*
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SECTION – I

2. a) A vapour compression refrigerator works between the pressure limits of 60 bar and 25 bar. The working fluid is just dry at the end of compression and there is no under-cooling of the liquid before the expansion valve. Determine :

i) C.O.P of the cycle;

ii) Dryness Fraction of refrigerant at the inlet of compressor;

iii) Capacity of refrigerator in KW and in TR, if the fluid flow is at the rate of 5 kg/min.

Data :

Pressure (bar)	Saturation Temperature (K)	Enthalpy (KJ/Kg)		Entropy (KJ/KgK)	
		Liquid	Vapour	Liquid	Vapour
60	295	151.96	293.29	0.554	1.0332
25	261	56.32	322.58	0.226	1.2464

12

b) Explain by flow diagram and on p-h diagram the compound compression with flash inter cooling with single expansion valve along the flow line to evaporator. **8**

3. a) Explain designation system for halocarbon refrigerants. Find chemical formula for R-22 and R-123. **6**

b) Explain with the help of neat diagram Electrolux Refrigeration System. **7**

c) Draw neat diagram of Regenerative air cooling system for air craft refrigeration and explain it with the help of its T-S diagram. **7**

4. a) Explain the Bell Coleman cycle with the help of its P-V and T-S diagram. Also show for Bell Coleman cycle

$$COP = \frac{1}{Rp^{\left(\frac{\gamma-1}{\gamma}\right)} - 1}$$ where Rp = pressure ratio. **10**

b) Describe the simple Aqua-Ammonia Vapour absorption system with the help of neat diagram. **6**

c) Explain the effect of CFC on Ozone depletion. **4**

SECTION – II

5. a) Explain the thermal exchange of human body with environment. **7**

b) For DBT of 38°C and RH of 70%, Calculate the following for air if barometric pressure is 1 bar. **8**

i) Specific Humidity

ii) Enthalpy of Air

iii) DPT

iv) Partial pressure of dry air.

Data :

Saturation Temp. (^{0}c)	Absolute Pressure (bar)	Enthalpy (KJ/Kg)			Entropy (KJ/KgK)		
		h_f	h_{fg}	h_g	S_f	S_{fg}	S_g
30	0.0425	125.8	2430.1	2556.3	0.437	8.016	8.453
31	0.0450	130.0	2428.1	2558.1	0.451	7.982	8.433
32	0.0476	134.2	2425.7	2559.9	0.464	7.948	8.413
33	0.0503	138.3	2423.4	2561.7	0.478	7.915	8.393
38	0.0663	159.2	2411.5	2570.7	0.546	7.749	8.295

c) Explain the limitations of VCRS system for production of low temperature. **5**

6. a) Explain two stage cascade refrigeration system with its P-h diagram. **8**

b) Write down general rules in designing the duct. **6**

c) Define and explain the following : **6**

i) DPT ii) GSHF iii) Equivalent Diameter

7. a) Air is flowing at the rate of 100 m^3/min at 40°C dry bulb temperature and 50% relative humidity is mixed with another air stream flowing at the rate of 20 m^3/min at 26°C dry bulb temperature and 50% relative humidity. The mixture flows over a cooling coil whose apparatus dew point temperature is 10°C and by-pass factor is 0.2. Find the dry bulb temperature and relative humidity of air leaving the coil. If this air is supplied to an air-conditioned room where dry bulb temperature of 26°C and relative humidity of 50% is maintained, also estimate : **12**

i) Room sensible heat factor

ii) Cooling load capacity of the coil in TR.

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c) Explain the procedure to draw RSHF line on Psychrometric chart when supply air conditions are not known. **4**

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Set P

SLR-VB – 107

Seat No.	

Set Q

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P.T.O.

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SLR-VB – 107

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
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c) Explain the procedure to draw RSHF line on Psychrometric chart when supply air conditions are not known. **4**

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Set Q

SLR-VB – 107

Seat No.	

Set R

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P.T.O.

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15) The sub-cooling in VCC system is used
   a) Before compression b) Before throttling
   c) After compression d) After throttling

16) CFC based refrigerants are being replaced as they are found to
   a) Cause ozone layer depletion
   b) Consume more energy
   c) React with several materials of construction
   d) Expensive

17) In aqua-ammonia and Lithium-bromide water absorption refrigeration systems, the refrigerants are respectively
   a) Water and water b) Water and lithium bromide
   c) Ammonia and lithium bromide d) Ammonia and water

18) A boot-strap air cooling system has
   a) One heat exchanger b) Two heat exchanger
   c) Three heat exchanger d) Four and water

19) Use of flash tank helps
   a) Flash gas formed during expansion can be removed at an intermediate pressure
   b) Temperature of refrigerant vapour at the inlet to higher stage compressor can be reduced
   c) Pressure drop in evaporator can be reduced
   d) All of above

20) For ammonia refrigerating systems, the tubes of a shell and tube condenser are made of
   a) Copper b) Aluminium c) Steel d) Brass

SLR-VB – 107

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
REFRIGERATION AND AIR CONDITIONING

Day and Date : Saturday, 6-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt **any two** questions from **each** Section.*
*2) Use of non-programmable calculator, steam table, Psychometric chart are **allowed**.*
*3) Assume suitable data **wherever** necessary.*

SECTION – I

2. a) A vapour compression refrigerator works between the pressure limits of 60 bar and 25 bar. The working fluid is just dry at the end of compression and there is no under-cooling of the liquid before the expansion valve. Determine :

i) C.O.P of the cycle;

ii) Dryness Fraction of refrigerant at the inlet of compressor;

iii) Capacity of refrigerator in KW and in TR, if the fluid flow is at the rate of 5 kg/min.

Data :

Pressure (bar)	Saturation Temperature (K)	Enthalpy (KJ/Kg)		Entropy (KJ/KgK)	
		Liquid	Vapour	Liquid	Vapour
60	295	151.96	293.29	0.554	1.0332
25	261	56.32	322.58	0.226	1.2464

12

b) Explain by flow diagram and on p-h diagram the compound compression with flash inter cooling with single expansion valve along the flow line to evaporator. **8**

3. a) Explain designation system for halocarbon refrigerants. Find chemical formula for R-22 and R-123. **6**

b) Explain with the help of neat diagram Electrolux Refrigeration System. **7**

c) Draw neat diagram of Regenerative air cooling system for air craft refrigeration and explain it with the help of its T-S diagram. **7**

4. a) Explain the Bell Coleman cycle with the help of its P-V and T-S diagram. Also show for Bell Coleman cycle

$$COP = \frac{1}{Rp^{\left(\frac{\gamma-1}{\gamma}\right)} - 1}$$ where Rp = pressure ratio. **10**

b) Describe the simple Aqua-Ammonia Vapour absorption system with the help of neat diagram. **6**

c) Explain the effect of CFC on Ozone depletion. **4**

SECTION – II

5. a) Explain the thermal exchange of human body with environment. **7**

b) For DBT of 38°C and RH of 70%, Calculate the following for air if barometric pressure is 1 bar. **8**

i) Specific Humidity

ii) Enthalpy of Air

iii) DPT

iv) Partial pressure of dry air.

Data :

Saturation Temp. (^{0}c)	Absolute Pressure (bar)	Enthalpy (KJ/Kg)			Entropy (KJ/KgK)		
		h_f	h_{fg}	h_g	S_f	S_{fg}	S_g
30	0.0425	125.8	2430.1	2556.3	0.437	8.016	8.453
31	0.0450	130.0	2428.1	2558.1	0.451	7.982	8.433
32	0.0476	134.2	2425.7	2559.9	0.464	7.948	8.413
33	0.0503	138.3	2423.4	2561.7	0.478	7.915	8.393
38	0.0663	159.2	2411.5	2570.7	0.546	7.749	8.295

c) Explain the limitations of VCRS system for production of low temperature. **5**

6. a) Explain two stage cascade refrigeration system with its P-h diagram. **8**

b) Write down general rules in designing the duct. **6**

c) Define and explain the following : **6**

i) DPT ii) GSHF iii) Equivalent Diameter

7. a) Air is flowing at the rate of 100 m^3/min at 40°C dry bulb temperature and 50% relative humidity is mixed with another air stream flowing at the rate of 20 m^3/min at 26°C dry bulb temperature and 50% relative humidity. The mixture flows over a cooling coil whose apparatus dew point temperature is 10°C and by-pass factor is 0.2. Find the dry bulb temperature and relative humidity of air leaving the coil. If this air is supplied to an air-conditioned room where dry bulb temperature of 26°C and relative humidity of 50% is maintained, also estimate : **12**

i) Room sensible heat factor

ii) Cooling load capacity of the coil in TR.

b) Write a short note on-Bypass factor of cooling coil. **4**

c) Explain the procedure to draw RSHF line on Psychrometric chart when supply air conditions are not known. **4**

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Set R

SLR-VB – 107

Seat No.	

Set S

B.E. (Mechanical) (Part – I) Examination, 2017
REFRIGERATION AND AIR CONDITIONING

Day and Date : Saturday, 6-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page**.*
*3) Attempt **any two** questions from **each** Section.*
*4) Use of non-programmable calculator, steam table, Psychometric chart are **allowed**.*
*5) Assume suitable data **wherever** necessary.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) CFC based refrigerants are being replaced as they are found to
   a) Cause ozone layer depletion
   b) Consume more energy
   c) React with several materials of construction
   d) Expensive

2) In aqua-ammonia and Lithium-bromide water absorption refrigeration systems, the refrigerants are respectively
   a) Water and water
   b) Water and lithium bromide
   c) Ammonia and lithium bromide
   d) Ammonia and water

3) A boot-strap air cooling system has
   a) One heat exchanger
   b) Two heat exchanger
   c) Three heat exchanger
   d) Four and water

4) Use of flash tank helps
   a) Flash gas formed during expansion can be removed at an intermediate pressure
   b) Temperature of refrigerant vapour at the inlet to higher stage compressor can be reduced
   c) Pressure drop in evaporator can be reduced
   d) All of above

5) For ammonia refrigerating systems, the tubes of a shell and tube condenser are made of
   a) Copper b) Aluminium c) Steel d) Brass

6) The value of degree of saturation for Saturated Air is
   a) 0.1 b) 0 c) 0.5 d) 1

7) The conditioned air supplied to the room must have the capacity to take up
   a) Room sensible heat load only
   b) Room latent heat load only
   c) Both room sensible heat and latent heat loads
   d) None of the above

P.T.O.

8) If relative humidity is 100%, then
   a) DBT is greater than WBT
   b) DBT is less than WBT
   c) DBT is equal to WBT
   d) DBT is less than DPT

9) In a psychrometric process, the sensible heat added is 30 kJ/sand the latent heat added is 20 kJ/s. The sensible heat factor for the process will be
   a) 0.3 b) 0.67 c) 0.6 d) 1.5

10) The alignment circle is marked on the psychrometric chart at
   a) 20°C *DBT* and 50% *RH*
   b) 26°C *DBT* and 50% *RH*
   c) 20°C *DBT* and 60% *RH*
   d) 26°C *DBT* and 60% *RH*

11) Human beings need air conditioning as
   a) They continuously dissipate heat due to metabolic activity
   b) Body regulatory mechanisms need stable internal temperatures
   c) Efficiency improves under controlled conditions
   d) All of the above

12) Equivalent length (Le) for calculation of dynamic pressure loss is given by equation

   a) $\frac{f}{Cm}$ b) $\frac{fC}{m}$ c) $\frac{fm}{C}$ d) $\frac{Cm}{f}$

13) For rectangular duct, the aspect ratio is equal to
   a) Sum of longer and shorter side
   b) Difference of longer and shorter side
   c) Product of longer and shorter side
   d) Ratio of longer to shorter side

14) Linde system for liquefaction of air is also known as
   a) Claude system b) Cascade system c) Hampson system d) Carnot system

15) During Sensible Cooling of air, the wet bulb temperature
   a) Increases b) Decrease c) Remains same d) Can't predict

16) A reversible Carnot cycle used for refrigeration comprises
   a) Two isentropic and two adiabatic processes
   b) Two isentropic and two constant volume processes
   c) Two isentropic and two constant pressure process
   d) Two isentropic and two isothermal processes

17) When water intercooling is used in multi-stage compression, it
   a) Reduces the work to be done in high pressure compressor
   b) Reduces the specific volume of refrigerant
   c) Requires a compressor of less stroke volume
   d) All of the above

18) The Freon group of refrigerants are also called as
   a) Halo-carbon refrigerants
   b) Azeotrope refrigerants
   c) Inorganic refrigerants
   d) Hydro-carbon refrigerants

19) In a three fluid vapour absorption refrigeration system, the hydrogen gas is used to
   a) Improve system performance
   b) Reduce the partial pressure of refrigerant in evaporator
   c) Circulate the refrigerant
   d) Provide a vapour seal

20) The sub-cooling in VCC system is used
   a) Before compression
   b) Before throttling
   c) After compression
   d) After throttling

SLR-VB – 107

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
REFRIGERATION AND AIR CONDITIONING

Day and Date : Saturday, 6-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt **any two** questions from **each** Section.*
*2) Use of non-programmable calculator, steam table, Psychometric chart are **allowed**.*
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SECTION – I

2. a) A vapour compression refrigerator works between the pressure limits of 60 bar and 25 bar. The working fluid is just dry at the end of compression and there is no under-cooling of the liquid before the expansion valve. Determine :

i) C.O.P of the cycle;

ii) Dryness Fraction of refrigerant at the inlet of compressor;

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b) Explain by flow diagram and on p-h diagram the compound compression with flash inter cooling with single expansion valve along the flow line to evaporator. **8**

3. a) Explain designation system for halocarbon refrigerants. Find chemical formula for R-22 and R-123. **6**

b) Explain with the help of neat diagram Electrolux Refrigeration System. **7**

c) Draw neat diagram of Regenerative air cooling system for air craft refrigeration and explain it with the help of its T-S diagram. **7**

4. a) Explain the Bell Coleman cycle with the help of its P-V and T-S diagram. Also show for Bell Coleman cycle

$$COP = \frac{1}{Rp^{\left(\frac{\gamma-1}{\gamma}\right)} - 1}$$ where Rp = pressure ratio. **10**

b) Describe the simple Aqua-Ammonia Vapour absorption system with the help of neat diagram. **6**

c) Explain the effect of CFC on Ozone depletion. **4**

SECTION – II

5. a) Explain the thermal exchange of human body with environment. **7**

b) For DBT of 38°C and RH of 70%, Calculate the following for air if barometric pressure is 1 bar. **8**

i) Specific Humidity

ii) Enthalpy of Air

iii) DPT

iv) Partial pressure of dry air.

Data :

Saturation Temp. (^{0}c)	Absolute Pressure (bar)	Enthalpy (KJ/Kg)			Entropy (KJ/KgK)		
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31	0.0450	130.0	2428.1	2558.1	0.451	7.982	8.433
32	0.0476	134.2	2425.7	2559.9	0.464	7.948	8.413
33	0.0503	138.3	2423.4	2561.7	0.478	7.915	8.393
38	0.0663	159.2	2411.5	2570.7	0.546	7.749	8.295

c) Explain the limitations of VCRS system for production of low temperature. **5**

6. a) Explain two stage cascade refrigeration system with its P-h diagram. **8**

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i) DPT ii) GSHF iii) Equivalent Diameter

7. a) Air is flowing at the rate of 100 m^3/min at 40°C dry bulb temperature and 50% relative humidity is mixed with another air stream flowing at the rate of 20 m^3/min at 26°C dry bulb temperature and 50% relative humidity. The mixture flows over a cooling coil whose apparatus dew point temperature is 10°C and by-pass factor is 0.2. Find the dry bulb temperature and relative humidity of air leaving the coil. If this air is supplied to an air-conditioned room where dry bulb temperature of 26°C and relative humidity of 50% is maintained, also estimate : **12**

i) Room sensible heat factor

ii) Cooling load capacity of the coil in TR.

b) Write a short note on-Bypass factor of cooling coil. **4**

c) Explain the procedure to draw RSHF line on Psychrometric chart when supply air conditions are not known. **4**

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Set S

SLR-VB – 108

Seat No.	

Set **P**

B.E. (Mechanical Engineering) (Part – I) Examination, 2017
Professional Elective – 3
FINITE ELEMENT METHODS

Day and Date : Monday, 8-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Note** : 1) Figures to the **right** indicate **full** marks.*
*2) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) The function which dictate the nodal contribution of field variable is
   A) Stress function B) Displacement function
   C) Force function D) Shape function

2) For analysis of fluid problems the appropriate commercial software package is
   A) Catia B) Pro-E C) FLUENT D) Hypermesh

3) A measure of distortion of a element is
   A) bandwidth B) damping ratio C) aspect ratio D) shape function

4) In computer integrated manufacturing (CIM) FEM is the following phase of a manufacturing
   A) CAD B) CAM C) CAE D) CAD/CAM

5) The element with quadratic interpolation function is called as
   A) Quadratic element B) Cubic element
   C) Linear D) None of the above

6) A problem which is not a function of a time
   A) Eigen value problem B) Steady state problem
   C) Transient problem D) Propagation problem

7) Interpolation functions can take any mathematical forms although in practice they are usually
   A) Trigonometric B) Exponential C) Polynomials D) None of the above

8) FEM is
   A) Exact method B) Approximate method
   C) Both A) and C) D) None of the above

9) In finite element method the term finite stands for
   A) Finite number of element B) Finite number of nodes
   C) Finite number of equations D) Finite number of degrees of freedom

10) The matrix showing relation between strain vector and displacement vector or temperature vector and temperature gradient is
   A) [D] B) [K] C) [C] D) [B]

11) The material property matrix is represented as
   A) [D] B) [K] C) [C] D) [B]

12) Which of the following is a weighted residual method ?
   A) Galerkin's method B) Variational method
   C) Potential energy method D) All of the above

13) Shock spectrum analysis is
   A) Steady state problem B) Eigen value problem
   C) Transient problem D) Static analysis

14) Tetrahedron with four corner nodes relates
   A) 3D simplex element B) Complex element
   C) Multiplex element D) None

15) Which problem area does stress analysis of crankshaft belong to ?
   A) Steady state problem B) Eigen value problem
   C) Propagation problem D) None of the above

16) Acoustic analysis of engine is best solved by
   A) Finite volume method B) Boundary element method
   C) Finite difference method D) Finite element analysis

17) If a matrix is singular it means _____
   A) All diagonal terms are non zero B) Inverse of the matrix is negative
   C) Diagonal terms are zero D) Inverse does not exist

18) Preprocessing consist of
   A) Building geometry B) Check the results
   C) Define material properties D) Assign boundary conditions

19) Which symmetry is applicable for stress analysis of a tensile test specimen ?
   A) Planar B) Axial
   C) Planar and axial D) Either or all of above

20) The equations defining the approximating distribution are known as
   A) Interpolation B) Integration C) Extrapolation D) Decomposition

_____

SLR-VB – 108

Seat No.	

B.E. (Mechanical Engineering) (Part – I) Examination, 2017
Professional Elective – 3
FINITE ELEMENT METHODS

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Answer **any two** questions from Section **I** and Section **II**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data **if necessary** and mention **it clearly**.*

SECTION – I

2. a) Explain formulation of the elements characteristics matrices and vectors for ID pin jointed bar element. **7**

   b) State and explain properties of global stiffness matrix. **6**

   c) Solve by subdomain and Galerkin method and compare with exact solution, for u(0.5) **7**

$$\frac{d^2u}{dx^2} + u - x^2 = 0 \qquad 0 \le x \le 1$$

B.C.S. u(0) = 0 .... EBC

$$\frac{du}{dx}(1) = 1 \text{ .... NBC}$$

3. a) Discuss the various matrices stated in the following equation. **7**

$$[k] = \phi\ [B]^T\ [D]\ [B]\ dv$$

   b) Explain one dimensional elasticity. **7**

   c) Discuss one dimensional, two dimensional and three dimensional elements and their properties. **6**

4. Write short notes on **any five** : **(4×5=20)**

   a) Principle of minimum potential energy.

   b) Explain axi-symmetric elasticity.

   c) Explain an axi-symmetric element.

   d) Explain any four choice of element type with application.

   e) Simplification using symmetry.

   f) Method of weighted residuals.

SECTION – II

5. a) Derive for shape function for one dimensional simplex element in natural coordinate. **7**
   b) Explain isoparametric, subparametric and superparametric elements. **6**
   c) Explain element distortions. **7**

6. a) Explain the following element checks offered by finite element packages.
      i) Mid side mode position
      ii) Internal angle. **7**
   b) Explain model validity and accuracy using approximation of geometry and material property. **7**
   c) Differentiate linear FEA and non linear FEA. **6**

7. Write short notes on **any five** : **(4×5=20)**
   a) Geometric non-linearity
   b) Convergence of interpolation functions
   c) Explain numerical integration
   d) Mesh refinement
   e) Modal analysis
   f) Explain transient thermal problems.

SLR-VB – 108

Seat No.	

Set **Q**

B.E. (Mechanical Engineering) (Part – I) Examination, 2017
Professional Elective – 3
FINITE ELEMENT METHODS

Day and Date : Monday, 8-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Note** : 1) Figures to the **right** indicate **full** marks.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Acoustic analysis of engine is best solved by
   A) Finite volume method B) Boundary element method
   C) Finite difference method D) Finite element analysis

2) If a matrix is singular it means _____
   A) All diagonal terms are non zero B) Inverse of the matrix is negative
   C) Diagonal terms are zero D) Inverse does not exist

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17) Which of the following is a weighted residual method ?
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SLR-VB – 108

Seat No.	

B.E. (Mechanical Engineering) (Part – I) Examination, 2017
Professional Elective – 3
FINITE ELEMENT METHODS

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

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SECTION – II

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SLR-VB – 108

Seat No.	

Set **R**

B.E. (Mechanical Engineering) (Part – I) Examination, 2017
Professional Elective – 3
FINITE ELEMENT METHODS

Day and Date : Monday, 8-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Note** : 1) Figures to the **right** indicate **full** marks.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) The material property matrix is represented as
A) [D] B) [K] C) [C] D) [B]

2) Which of the following is a weighted residual method ?
A) Galerkin's method B) Variational method
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8) Preprocessing consist of
   A) Building geometry B) Check the results
   C) Define material properties D) Assign boundary conditions

9) Which symmetry is applicable for stress analysis of a tensile test specimen ?
   A) Planar B) Axial
   C) Planar and axial D) Either or all of above

10) The equations defining the approximating distribution are known as
   A) Interpolation B) Integration C) Extrapolation D) Decomposition

11) The function which dictate the nodal contribution of field variable is
   A) Stress function B) Displacement function
   C) Force function D) Shape function

12) For analysis of fluid problems the appropriate commercial software package is
   A) Catia B) Pro-E C) FLUENT D) Hypermesh

13) A measure of distortion of a element is
   A) bandwidth B) damping ratio C) aspect ratio D) shape function

14) In computer integrated manufacturing (CIM) FEM is the following phase of a manufacturing
   A) CAD B) CAM C) CAE D) CAD/CAM

15) The element with quadratic interpolation function is called as
   A) Quadratic element B) Cubic element
   C) Linear D) None of the above

16) A problem which is not a function of a time
   A) Eigen value problem B) Steady state problem
   C) Transient problem D) Propagation problem

17) Interpolation functions can take any mathematical forms although in practice they are usually
   A) Trigonometric B) Exponential C) Polynomials D) None of the above

18) FEM is
   A) Exact method B) Approximate method
   C) Both A) and C) D) None of the above

19) In finite element method the term finite stands for
   A) Finite number of element B) Finite number of nodes
   C) Finite number of equations D) Finite number of degrees of freedom

20) The matrix showing relation between strain vector and displacement vector or temperature vector and temperature gradient is
   A) [D] B) [K] C) [C] D) [B]

_____

SLR-VB – 108

Seat No.	

B.E. (Mechanical Engineering) (Part – I) Examination, 2017
Professional Elective – 3
FINITE ELEMENT METHODS

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Answer **any two** questions from Section **I** and Section **II**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data **if necessary** and mention **it clearly**.*

SECTION – I

2. a) Explain formulation of the elements characteristics matrices and vectors for ID pin jointed bar element. **7**

   b) State and explain properties of global stiffness matrix. **6**

   c) Solve by subdomain and Galerkin method and compare with exact solution, for u(0.5) **7**

$$\frac{d^2u}{dx^2} + u - x^2 = 0 \qquad 0 \le x \le 1$$

B.C.S. u(0) = 0 .... EBC

$$\frac{du}{dx}(1) = 1 \text{ .... NBC}$$

3. a) Discuss the various matrices stated in the following equation. **7**

$$[k] = \phi\ [B]^T\ [D]\ [B]\ dv$$

   b) Explain one dimensional elasticity. **7**

   c) Discuss one dimensional, two dimensional and three dimensional elements and their properties. **6**

4. Write short notes on **any five** : **(4×5=20)**

   a) Principle of minimum potential energy.

   b) Explain axi-symmetric elasticity.

   c) Explain an axi-symmetric element.

   d) Explain any four choice of element type with application.

   e) Simplification using symmetry.

   f) Method of weighted residuals.

SECTION – II

5. a) Derive for shape function for one dimensional simplex element in natural coordinate. **7**
   b) Explain isoparametric, subparametric and superparametric elements. **6**
   c) Explain element distortions. **7**

6. a) Explain the following element checks offered by finite element packages.
      i) Mid side mode position
      ii) Internal angle. **7**
   b) Explain model validity and accuracy using approximation of geometry and material property. **7**
   c) Differentiate linear FEA and non linear FEA. **6**

7. Write short notes on **any five** : **(4×5=20)**
   a) Geometric non-linearity
   b) Convergence of interpolation functions
   c) Explain numerical integration
   d) Mesh refinement
   e) Modal analysis
   f) Explain transient thermal problems.

SLR-VB – 108

Seat No.	

Set **S**

B.E. (Mechanical Engineering) (Part – I) Examination, 2017
Professional Elective – 3
FINITE ELEMENT METHODS

Day and Date : Monday, 8-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Note** : 1) Figures to the **right** indicate **full** marks.*
*2) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*3) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) A problem which is not a function of a time
   A) Eigen value problem B) Steady state problem
   C) Transient problem D) Propagation problem

2) Interpolation functions can take any mathematical forms although in practice they are usually
   A) Trigonometric B) Exponential C) Polynomials D) None of the above

3) FEM is
   A) Exact method B) Approximate method
   C) Both A) and C) D) None of the above

4) In finite element method the term finite stands for
   A) Finite number of element B) Finite number of nodes
   C) Finite number of equations D) Finite number of degrees of freedom

5) The matrix showing relation between strain vector and displacement vector or temperature vector and temperature gradient is
   A) [D] B) [K] C) [C] D) [B]

6) The material property matrix is represented as
   A) [D] B) [K] C) [C] D) [B]

7) Which of the following is a weighted residual method ?
   A) Galerkin's method B) Variational method
   C) Potential energy method D) All of the above

P.T.O.

8) Shock spectrum analysis is
   A) Steady state problem B) Eigen value problem
   C) Transient problem D) Static analysis

9) Tetrahedron with four corner nodes relates
   A) 3D simplex element B) Complex element
   C) Multiplex element D) None

10) Which problem area does stress analysis of crankshaft belong to ?
   A) Steady state problem B) Eigen value problem
   C) Propagation problem D) None of the above

11) Acoustic analysis of engine is best solved by
   A) Finite volume method B) Boundary element method
   C) Finite difference method D) Finite element analysis

12) If a matrix is singular it means _____
   A) All diagonal terms are non zero B) Inverse of the matrix is negative
   C) Diagonal terms are zero D) Inverse does not exist

13) Preprocessing consist of
   A) Building geometry B) Check the results
   C) Define material properties D) Assign boundary conditions

14) Which symmetry is applicable for stress analysis of a tensile test specimen ?
   A) Planar B) Axial
   C) Planar and axial D) Either or all of above

15) The equations defining the approximating distribution are known as
   A) Interpolation B) Integration C) Extrapolation D) Decomposition

16) The function which dictate the nodal contribution of field variable is
   A) Stress function B) Displacement function
   C) Force function D) Shape function

17) For analysis of fluid problems the appropriate commercial software package is
   A) Catia B) Pro-E C) FLUENT D) Hypermesh

18) A measure of distortion of a element is
   A) bandwidth B) damping ratio C) aspect ratio D) shape function

19) In computer integrated manufacturing (CIM) FEM is the following phase of a manufacturing
   A) CAD B) CAM C) CAE D) CAD/CAM

20) The element with quadratic interpolation function is called as
   A) Quadratic element B) Cubic element
   C) Linear D) None of the above

SLR-VB – 108

Seat No.	

B.E. (Mechanical Engineering) (Part – I) Examination, 2017
Professional Elective – 3
FINITE ELEMENT METHODS

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Answer **any two** questions from Section **I** and Section **II**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data **if necessary** and mention **it clearly**.*

SECTION – I

2. a) Explain formulation of the elements characteristics matrices and vectors for ID pin jointed bar element. **7**

   b) State and explain properties of global stiffness matrix. **6**

   c) Solve by subdomain and Galerkin method and compare with exact solution, for u(0.5) **7**

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B.C.S. u(0) = 0 .... EBC

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3. a) Discuss the various matrices stated in the following equation. **7**

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   b) Explain one dimensional elasticity. **7**

   c) Discuss one dimensional, two dimensional and three dimensional elements and their properties. **6**

4. Write short notes on **any five** : **(4×5=20)**

   a) Principle of minimum potential energy.

   b) Explain axi-symmetric elasticity.

   c) Explain an axi-symmetric element.

   d) Explain any four choice of element type with application.

   e) Simplification using symmetry.

   f) Method of weighted residuals.

SECTION – II

5. a) Derive for shape function for one dimensional simplex element in natural coordinate. **7**
   b) Explain isoparametric, subparametric and superparametric elements. **6**
   c) Explain element distortions. **7**

6. a) Explain the following element checks offered by finite element packages.
      i) Mid side mode position
      ii) Internal angle. **7**
   b) Explain model validity and accuracy using approximation of geometry and material property. **7**
   c) Differentiate linear FEA and non linear FEA. **6**

7. Write short notes on **any five** : **(4×5=20)**
   a) Geometric non-linearity
   b) Convergence of interpolation functions
   c) Explain numerical integration
   d) Mesh refinement
   e) Modal analysis
   f) Explain transient thermal problems.

SLR-VB – 109

Seat No.	

Set **P**

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMOBILE ENGINEERING
Professional Elective – 3

Day and Date : Monday, 8-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data if ***necessary*** *and mention it* ***clearly****.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Compared to framed construction, the frame less construction of automobiles is economical
   a) always b) when produced in small quantities
   c) when produced on large scale d) never

2) The example of a saloon is
   a) Premier car b) Tata truck c) Leyland bus d) None of these

3) Lateral bending of the frame side members may be caused on account of
   a) Weight of passengers b) Side wind
   c) Engine torque d) Braking torque

4) The most effective section against bending is
   a) rectangular bar b) round bar
   c) round hollow tube d) square hollow section

5) Free pedal play in car clutches is about
   a) 3 mm b) 30 mm c) 60 mm d) 100 mm

6) Cushioning springs in clutch plate are meant to reduce
   a) torsional vibrations b) vehicle speed
   c) jerky starts d) none of the above

7) Increase of torque in a vehicle is obtained by
   a) decreasing speed b) decreasing power
   c) decreasing petrol consumption d) all of the above

P.T.O.

8) By using synchronizing device, the two involved adjacent gears have their speeds
a) increased b) reduced c) equalized d) unequalized

9) The component of the torque converter that drives the oil is the
a) turbine b) impeller c) free wheel d) stator

10) The function of a universal joint is to allow the propeller shaft to
a) change length b) bend sideways
c) transfer torque at an angle d) change inclination

11) A two-piece propeller shaft requires
a) one universal joint b) a centre support bearing
c) the shaft to be solid d) none of the above

12) The function of a shackle with a leaf spring is to
a) allow pivoting of spring end b) allow spring length to change
c) control sideways d) control rear torque

13) The function of a stabilizer in an automobile is to decrease the tendency to
a) roll b) pitch c) yaw d) dip

14) The turning circle for a car is approximately
a) 1 metre b) 2 metres c) 10 metres d) 30 metres

15) The angle formed by the wheel with the vertical when the top of the wheel slants outward is called
a) positive camber b) negative camber
c) positive castor d) negative castor

16) Most popular manual steering gear for cars today is
a) rack and pinion type b) worm and wheel type
c) cam and roller type d) worm and nut type

17) The steering ratio for manual steering of cars is approximately
a) 5 b) 15 c) 50 d) 100

18) The function of charging system is to generate, regulate and supply _____ energy for charging battery.
a) Electrical b) Mechanical c) Chemical d) None of these

19) The type of wheel which cannot be used with a tubeless tyre is
a) disc wheel b) wire wheel
c) light alloy wheel d) composite wheel

20) In Maruti car the brakes used are
a) disc brakes only b) drum brakes only
c) disc on front and drum on rear d) drum on front and disc on rear

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SLR-VB – 109

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMOBILE ENGINEERING
Professional Elective – 3

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer **any two** questions from **each** Section.*
*2) **Use** of non-programmable calculator is **allowed**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assume suitable data if **necessary** and mention it **clearly**.*

SECTION – I

2. a) Explain with neat sketch the front engine front wheel drive layout with its advantages and disadvantages. Also explain the difference between 4 wheel drive and all wheel drive arrangements. **10**

   b) Write short notes on : **10**
   1) Safety devices on automobiles.
   2) Automobile body materials.

3. a) Why multiplate clutches are used in automobiles ? Explain with a neat sketch the construction and working of a multiplate wet clutch along with its advantages and disadvantages. **10**

   b) Write short note on Propeller shaft. **4**

   c) Draw a neat sketch of overdrive and explain its working. **6**

4. a) The coefficient of rolling resistance for a truck weighing 62293.5 N is 0.018 and the coefficient of air resistance is 0.0276 in the formula $R = kW + KaAV^2$ in N, where A is frontal area in m^2 and V is the speed in km/hr. The transmission efficiency in top gear of 6.2 : 1 is 90% and that in the second gear of 15 : 1 is 80%. The frontal area is 5.574 m^2. If the truck has to have a maximum speed of 88 km/hr in top gear calculate, **12**
   i) The engine brake power required.
   ii) The engine speed if the driving wheels have an effective diameter of 0.8125 m.
   iii) The maximum grade the truck can negotiate at above engine speed in second gear and
   iv) The maximum drawbar pull available on level road at the above engine speed in second gear.

   b) Write short notes on : **8**
   i) Automobile starting system ii) Electric horn.

SECTION – II

5. a) Explain true rolling condition. Whether Ackerman's steering mechanism obey it ? Explain significance of under steer and over steer. **8**
   b) Write a note on antilock braking system. **6**
   c) Explain with neat sketch Hotch Kiss drive. **6**

6. a) Explain engine control module with different sensors and actuators used. **7**
   b) What is need of reaction member in automobile ? Explain any one. **7**
   c) Write a note on effect of slip angle on over steer and under steer conditions. **6**

7. a) A motor car has a wheel base of 2.64 m the height of its CG above the ground is 0.61 m and it is 1.2 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, when (A) The rear wheels are braked. (B) The front wheels are braked. (C) All wheels are braked. **9**
   b) Explain the terms Scrub radius and Turning circle radius. **6**
   c) Write note on suspension requirement, sprung and unsprung mass. **5**

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SLR-VB – 109

Seat No.	

Set **Q**

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMOBILE ENGINEERING
Professional Elective – 3

Day and Date : Monday, 8-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data if ***necessary*** *and mention it* ***clearly****.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Most popular manual steering gear for cars today is
   a) rack and pinion type b) worm and wheel type
   c) cam and roller type d) worm and nut type

2) The steering ratio for manual steering of cars is approximately
   a) 5 b) 15 c) 50 d) 100

3) The function of charging system is to generate, regulate and supply _____ energy for charging battery.
   a) Electrical b) Mechanical c) Chemical d) None of these

4) The type of wheel which cannot be used with a tubeless tyre is
   a) disc wheel b) wire wheel
   c) light alloy wheel d) composite wheel

5) In Maruti car the brakes used are
   a) disc brakes only b) drum brakes only
   c) disc on front and drum on rear d) drum on front and disc on rear

6) Compared to framed construction, the frame less construction of automobiles is economical
   a) always b) when produced in small quantities
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7) The example of a saloon is
   a) Premier car b) Tata truck c) Leyland bus d) None of these

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   a) Weight of passengers b) Side wind
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10) Free pedal play in car clutches is about
   a) 3 mm b) 30 mm c) 60 mm d) 100 mm

11) Cushioning springs in clutch plate are meant to reduce
   a) torsional vibrations b) vehicle speed
   c) jerky starts d) none of the above

12) Increase of torque in a vehicle is obtained by
   a) decreasing speed b) decreasing power
   c) decreasing petrol consumption d) all of the above

13) By using synchronizing device, the two involved adjacent gears have their speeds
   a) increased b) reduced c) equalized d) unequalized

14) The component of the torque converter that drives the oil is the
   a) turbine b) impeller c) free wheel d) stator

15) The function of a universal joint is to allow the propeller shaft to
   a) change length b) bend sideways
   c) transfer torque at an angle d) change inclination

16) A two-piece propeller shaft requires
   a) one universal joint b) a centre support bearing
   c) the shaft to be solid d) none of the above

17) The function of a shackle with a leaf spring is to
   a) allow pivoting of spring end b) allow spring length to change
   c) control sideways d) control rear torque

18) The function of a stabilizer in an automobile is to decrease the tendency to
   a) roll b) pitch c) yaw d) dip

19) The turning circle for a car is approximately
   a) 1 metre b) 2 metres c) 10 metres d) 30 metres

20) The angle formed by the wheel with the vertical when the top of the wheel slants outward is called
   a) positive camber b) negative camber
   c) positive castor d) negative castor

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SLR-VB – 109

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMOBILE ENGINEERING
Professional Elective – 3

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer **any two** questions from **each** Section.*
*2) **Use** of non-programmable calculator is **allowed**.*
*3) Figures to the **right** indicate **full** marks.*
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SECTION – I

2. a) Explain with neat sketch the front engine front wheel drive layout with its advantages and disadvantages. Also explain the difference between 4 wheel drive and all wheel drive arrangements. **10**

   b) Write short notes on : **10**
   1) Safety devices on automobiles.
   2) Automobile body materials.

3. a) Why multiplate clutches are used in automobiles ? Explain with a neat sketch the construction and working of a multiplate wet clutch along with its advantages and disadvantages. **10**

   b) Write short note on Propeller shaft. **4**

   c) Draw a neat sketch of overdrive and explain its working. **6**

4. a) The coefficient of rolling resistance for a truck weighing 62293.5 N is 0.018 and the coefficient of air resistance is 0.0276 in the formula $R = kW + KaAV^2$ in N, where A is frontal area in m^2 and V is the speed in km/hr. The transmission efficiency in top gear of 6.2 : 1 is 90% and that in the second gear of 15 : 1 is 80%. The frontal area is 5.574 m^2. If the truck has to have a maximum speed of 88 km/hr in top gear calculate, **12**
   i) The engine brake power required.
   ii) The engine speed if the driving wheels have an effective diameter of 0.8125 m.
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   iv) The maximum drawbar pull available on level road at the above engine speed in second gear.

   b) Write short notes on : **8**
   i) Automobile starting system ii) Electric horn.

SECTION – II

5. a) Explain true rolling condition. Whether Ackerman's steering mechanism obey it ? Explain significance of under steer and over steer. **8**

   b) Write a note on antilock braking system. **6**

   c) Explain with neat sketch Hotch Kiss drive. **6**

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   c) Write a note on effect of slip angle on over steer and under steer conditions. **6**

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   b) Explain the terms Scrub radius and Turning circle radius. **6**

   c) Write note on suspension requirement, sprung and unsprung mass. **5**

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SLR-VB – 109

Seat No.	

Set R

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMOBILE ENGINEERING
Professional Elective – 3

Day and Date : Monday, 8-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*
*2) Assume suitable data if **necessary** and mention it **clearly**.*
*3) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*4) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) A two-piece propeller shaft requires
   a) one universal joint b) a centre support bearing
   c) the shaft to be solid d) none of the above

2) The function of a shackle with a leaf spring is to
   a) allow pivoting of spring end b) allow spring length to change
   c) control sideways d) control rear torque

3) The function of a stabilizer in an automobile is to decrease the tendency to
   a) roll b) pitch c) yaw d) dip

4) The turning circle for a car is approximately
   a) 1 metre b) 2 metres c) 10 metres d) 30 metres

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6) Most popular manual steering gear for cars today is
   a) rack and pinion type b) worm and wheel type
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a) disc wheel b) wire wheel
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c) transfer torque at an angle d) change inclination

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SLR-VB – 109

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMOBILE ENGINEERING
Professional Elective – 3

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer **any two** questions from **each** Section.*
*2) **Use** of non-programmable calculator is **allowed**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assume suitable data if **necessary** and mention it **clearly**.*

SECTION – I

2. a) Explain with neat sketch the front engine front wheel drive layout with its advantages and disadvantages. Also explain the difference between 4 wheel drive and all wheel drive arrangements. **10**

   b) Write short notes on : **10**
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3. a) Why multiplate clutches are used in automobiles ? Explain with a neat sketch the construction and working of a multiplate wet clutch along with its advantages and disadvantages. **10**

   b) Write short note on Propeller shaft. **4**

   c) Draw a neat sketch of overdrive and explain its working. **6**

4. a) The coefficient of rolling resistance for a truck weighing 62293.5 N is 0.018 and the coefficient of air resistance is 0.0276 in the formula $R = kW + KaAV^2$ in N, where A is frontal area in m^2 and V is the speed in km/hr. The transmission efficiency in top gear of 6.2 : 1 is 90% and that in the second gear of 15 : 1 is 80%. The frontal area is 5.574 m^2. If the truck has to have a maximum speed of 88 km/hr in top gear calculate, **12**
   i) The engine brake power required.
   ii) The engine speed if the driving wheels have an effective diameter of 0.8125 m.
   iii) The maximum grade the truck can negotiate at above engine speed in second gear and
   iv) The maximum drawbar pull available on level road at the above engine speed in second gear.

   b) Write short notes on : **8**
   i) Automobile starting system ii) Electric horn.

SECTION – II

5. a) Explain true rolling condition. Whether Ackerman's steering mechanism obey it ? Explain significance of under steer and over steer. **8**

   b) Write a note on antilock braking system. **6**

   c) Explain with neat sketch Hotch Kiss drive. **6**

6. a) Explain engine control module with different sensors and actuators used. **7**

   b) What is need of reaction member in automobile ? Explain any one. **7**

   c) Write a note on effect of slip angle on over steer and under steer conditions. **6**

7. a) A motor car has a wheel base of 2.64 m the height of its CG above the ground is 0.61 m and it is 1.2 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, when (A) The rear wheels are braked. (B) The front wheels are braked. (C) All wheels are braked. **9**

   b) Explain the terms Scrub radius and Turning circle radius. **6**

   c) Write note on suspension requirement, sprung and unsprung mass. **5**

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SLR-VB – 109

Seat No.	

Set **S**

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMOBILE ENGINEERING
Professional Elective – 3

Day and Date : Monday, 8-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) Assume suitable data if ***necessary*** *and mention it* ***clearly****.*
3) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
4) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Cushioning springs in clutch plate are meant to reduce
   a) torsional vibrations b) vehicle speed
   c) jerky starts d) none of the above

2) Increase of torque in a vehicle is obtained by
   a) decreasing speed b) decreasing power
   c) decreasing petrol consumption d) all of the above

3) By using synchronizing device, the two involved adjacent gears have their speeds
   a) increased b) reduced c) equalized d) unequalized

4) The component of the torque converter that drives the oil is the
   a) turbine b) impeller c) free wheel d) stator

5) The function of a universal joint is to allow the propeller shaft to
   a) change length b) bend sideways
   c) transfer torque at an angle d) change inclination

6) A two-piece propeller shaft requires
   a) one universal joint b) a centre support bearing
   c) the shaft to be solid d) none of the above

7) The function of a shackle with a leaf spring is to
   a) allow pivoting of spring end b) allow spring length to change
   c) control sideways d) control rear torque

8) The function of a stabilizer in an automobile is to decrease the tendency to
a) roll b) pitch c) yaw d) dip

9) The turning circle for a car is approximately
a) 1 metre b) 2 metres c) 10 metres d) 30 metres

10) The angle formed by the wheel with the vertical when the top of the wheel slants outward is called
a) positive camber b) negative camber
c) positive castor d) negative castor

11) Most popular manual steering gear for cars today is
a) rack and pinion type b) worm and wheel type
c) cam and roller type d) worm and nut type

12) The steering ratio for manual steering of cars is approximately
a) 5 b) 15 c) 50 d) 100

13) The function of charging system is to generate, regulate and supply _____ energy for charging battery.
a) Electrical b) Mechanical c) Chemical d) None of these

14) The type of wheel which cannot be used with a tubeless tyre is
a) disc wheel b) wire wheel
c) light alloy wheel d) composite wheel

15) In Maruti car the brakes used are
a) disc brakes only b) drum brakes only
c) disc on front and drum on rear d) drum on front and disc on rear

16) Compared to framed construction, the frame less construction of automobiles is economical
a) always b) when produced in small quantities
c) when produced on large scale d) never

17) The example of a saloon is
a) Premier car b) Tata truck c) Leyland bus d) None of these

18) Lateral bending of the frame side members may be caused on account of
a) Weight of passengers b) Side wind
c) Engine torque d) Braking torque

19) The most effective section against bending is
a) rectangular bar b) round bar
c) round hollow tube d) square hollow section

20) Free pedal play in car clutches is about
a) 3 mm b) 30 mm c) 60 mm d) 100 mm

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SLR-VB – 109

Seat No.	

B.E. (Mech.) (Part – I) Examination, 2017
AUTOMOBILE ENGINEERING
Professional Elective – 3

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer **any two** questions from **each** Section.*
*2) **Use** of non-programmable calculator is **allowed**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assume suitable data if **necessary** and mention it **clearly**.*

SECTION – I

2. a) Explain with neat sketch the front engine front wheel drive layout with its advantages and disadvantages. Also explain the difference between 4 wheel drive and all wheel drive arrangements. **10**

   b) Write short notes on : **10**
   1) Safety devices on automobiles.
   2) Automobile body materials.

3. a) Why multiplate clutches are used in automobiles ? Explain with a neat sketch the construction and working of a multiplate wet clutch along with its advantages and disadvantages. **10**

   b) Write short note on Propeller shaft. **4**

   c) Draw a neat sketch of overdrive and explain its working. **6**

4. a) The coefficient of rolling resistance for a truck weighing 62293.5 N is 0.018 and the coefficient of air resistance is 0.0276 in the formula $R = kW + KaAV^2$ in N, where A is frontal area in m^2 and V is the speed in km/hr. The transmission efficiency in top gear of 6.2 : 1 is 90% and that in the second gear of 15 : 1 is 80%. The frontal area is 5.574 m^2. If the truck has to have a maximum speed of 88 km/hr in top gear calculate, **12**
   i) The engine brake power required.
   ii) The engine speed if the driving wheels have an effective diameter of 0.8125 m.
   iii) The maximum grade the truck can negotiate at above engine speed in second gear and
   iv) The maximum drawbar pull available on level road at the above engine speed in second gear.

   b) Write short notes on : **8**
   i) Automobile starting system ii) Electric horn.

SECTION – II

5. a) Explain true rolling condition. Whether Ackerman's steering mechanism obey it ? Explain significance of under steer and over steer. **8**

   b) Write a note on antilock braking system. **6**

   c) Explain with neat sketch Hotch Kiss drive. **6**

6. a) Explain engine control module with different sensors and actuators used. **7**

   b) What is need of reaction member in automobile ? Explain any one. **7**

   c) Write a note on effect of slip angle on over steer and under steer conditions. **6**

7. a) A motor car has a wheel base of 2.64 m the height of its CG above the ground is 0.61 m and it is 1.2 m in front of the rear axle. If the car is travelling at 40 km/hr on a level track, determine the minimum distance in which the car may be stopped, when (A) The rear wheels are braked. (B) The front wheels are braked. (C) All wheels are braked. **9**

   b) Explain the terms Scrub radius and Turning circle radius. **6**

   c) Write note on suspension requirement, sprung and unsprung mass. **5**

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SLR-VB – 110

Seat No.	

Set **P**

B.E. (Mechanical) (Part – I) Examination, 2017
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Monday, 8-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Question Number **1, 2** and **6** are **compulsory**.*
*2) Answer **any two full** questions from the remaining in **each** Section.*
*3) Figures to right indicate **full** marks.*
*4) Make **suitable** assumptions, if required and state them **clearly**.*
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. A) Choose the correct answers : **(1×10=10)**

1) Which of the following departments employ process picture ?
A) Production department B) Marketing department
C) Design department D) Inspection department

2) In process picture locator is considered as
A) Cube B) Triangle C) Cone D) Pyramid

3) Standard type of each option is decided by
A) Product Engineer B) Process Engineer
C) Time study Engineer D) Method Engineer

4) Which of the following departments is the heart of organisation ?
A) Marketing Engineering B) Tool Room
C) Production Engineering D) Process Engineering

P.T.O.

5) In process type of layout all machines are in
   A) In-line B) In group
   C) In random D) Fixed position

6) Which of the following products is not continuous/process mfg. system ?
   A) Cars B) Fertilizer
   C) Petrochemical D) Steel

7) The documents released by process engineering departments are
   A) Machine tool used B) Route sheet
   C) Sequence of operation D) All of above

8) Which of the following are the causes of tolerance stack ?
   A) Product design B) Inspection method
   C) Tooling D) Machines

9) The flexibility of operations is achieved in
   A) SPM B) GPM
   C) Automats D) All of above

10) Operation that bring raw part out of "rough" is
   A) Major operation B) Originating operation
   C) Qualifying operation D) Auxiliary operation

B) Match the pair : **10**

a) Forging of blank	1) Principal process operation	**5**
b) Machining of spur gear on milling	2) Major operation	
c) Keyway cutting on slotting	3) Auxiliary operation	
d) Heat treatment of gear	4) Supporting operation	
e) Inspection, packaging and dispatch	5) Basic process operation	
f) Locating surface	6) Qualifying operation	
a) Design tolerance stack	1) Process engineer	**2**
b) Process tolerance stack	2) Product engineer	
a) Job production	1) Capstan lathe	**3**
b) Batch production	2) Automatic lathe	
c) Mass production	3) Centre lathe	

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SLR-VB – 110

Seat No.	

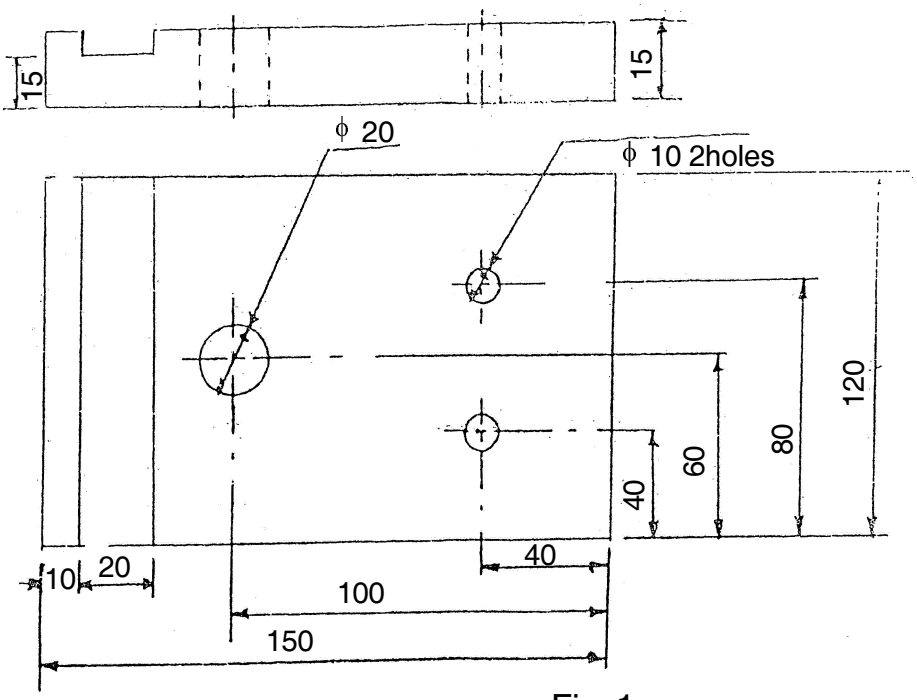
B.E. (Mechanical) (Part – I) Examination, 2017
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. **2** and Q. **6** are **compuslory**.*
*2) Solve **any 2** questions from **each** Section.*

SECTION – I

2. Prepare a process plan for manufacturing the component in Fig. 1 w.r.t. data supplied there in along following lines.
   A) Route sheet.
   B) Operations list indicating sequence of operation indicating machine selected, holding methods, tool specifications and machining parameters per set up.
   C) Gauges and or inspection methods and instruments. **20**



MH – M.S tolerances on m/cned dimensions are ± 0.1. All dimensions are in mm Production – job type

Fig. 1

3. a) Explain in detail characteristics of the manufacturing system. **5**
   b) Write a note on part print analysis. **5**

Set P

4. Explain the position and function of product and process engineer in the organization. **10**

5. a) What are the documents released by the product and process engineering departments ? **5**

   b) What are the general guidelines for manual process ? **5**

SECTION – II

6. Draw the process picture sheet for any four operations for manufacturing the component in Fig. 1 w.r.t. sequence. Use standard symbols for locating, clamping along with material removal. **20**

7. a) Explain in detail selection criterion for GPM and SPM. **5**

   b) What are the technical considerations for equipment selection ? Explain. **5**

8. How do you classify the operations ? **10**

9. a) What are the general guidelines for process selection ? Explain. **5**

   b) Explain in detail selection of tooling. **5**

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SLR-VB – 110

Seat No.	

Set Q

B.E. (Mechanical) (Part – I) Examination, 2017
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Monday, 8-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Question Number **1, 2** and **6** are **compulsory**.*
*2) Answer **any two full** questions from the remaining in **each** Section.*
*3) Figures to right indicate **full** marks.*
*4) Make **suitable** assumptions, if required and state them **clearly**.*
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. A) Match the pair : **10**

a) Forging of blank	1) Principal process operation	**5**
b) Machining of spur gear on milling	2) Major operation	
c) Keyway cutting on slotting	3) Auxiliary operation	
d) Heat treatment of gear	4) Supporting operation	
e) Inspection, packaging and dispatch	5) Basic process operation	
f) Locating surface	6) Qualifying operation	

a) Design tolerance stack	1) Process engineer	**2**
b) Process tolerance stack	2) Product engineer	

a) Job production	1) Capstan lathe	**3**
b) Batch production	2) Automatic lathe	
c) Mass production	3) Centre lathe	

P.T.O.

B) Choose the correct answers : **(1×10=10)**

1) The flexibility of operations is achieved in
   A) SPM B) GPM C) Automats D) All of above

2) Operation that bring raw part out of "rough" is
   A) Major operation B) Originating operation
   C) Qualifying operation D) Auxiliary operation

3) The documents released by process engineering departments are
   A) Machine tool used B) Route sheet
   C) Sequence of operation D) All of above

4) Which of the following are the causes of tolerance stack ?
   A) Product design B) Inspection method
   C) Tooling D) Machines

5) Which of the following departments employ process picture ?
   A) Production department B) Marketing department
   C) Design department D) Inspection department

6) In process picture locator is considered as
   A) Cube B) Triangle C) Cone D) Pyramid

7) Standard type of each option is decided by
   A) Product Engineer B) Process Engineer
   C) Time study Engineer D) Method Engineer

8) Which of the following departments is the heart of organisation ?
   A) Marketing Engineering B) Tool Room
   C) Production Engineering D) Process Engineering

9) In process type of layout all machines are in
   A) In-line B) In group C) In random D) Fixed position

10) Which of the following products is not continuous/process mfg. system ?
   A) Cars B) Fertilizer
   C) Petrochemical D) Steel

SLR-VB – 110

Seat No.	

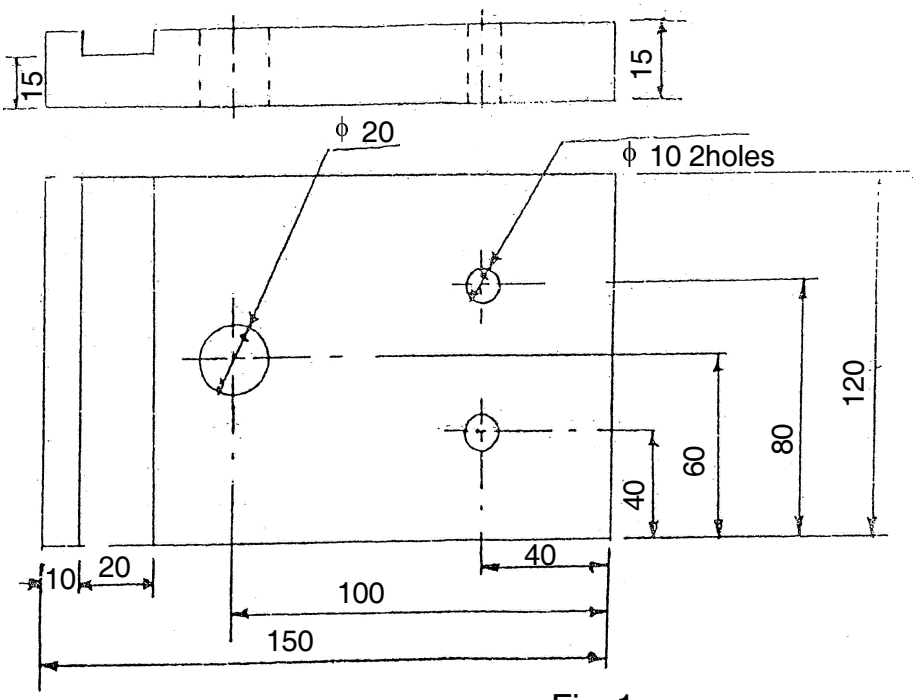
B.E. (Mechanical) (Part – I) Examination, 2017
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. **2** and Q. **6** are **compuslory**.*
*2) Solve **any 2** questions from **each** Section.*

SECTION – I

2. Prepare a process plan for manufacturing the component in Fig. 1 w.r.t. data supplied there in along following lines.
   A) Route sheet.
   B) Operations list indicating sequence of operation indicating machine selected, holding methods, tool specifications and machining parameters per set up.
   C) Gauges and or inspection methods and instruments. **20**



MH – M.S tolerances on m/cned dimensions are ± 0.1. All dimensions are in mm Production – job type

Fig. 1

3. a) Explain in detail characteristics of the manufacturing system. **5**
   b) Write a note on part print analysis. **5**

Set Q

4. Explain the position and function of product and process engineer in the organization. **10**

5. a) What are the documents released by the product and process engineering departments ? **5**

   b) What are the general guidelines for manual process ? **5**

SECTION – II

6. Draw the process picture sheet for any four operations for manufacturing the component in Fig. 1 w.r.t. sequence. Use standard symbols for locating, clamping along with material removal. **20**

7. a) Explain in detail selection criterion for GPM and SPM. **5**

   b) What are the technical considerations for equipment selection ? Explain. **5**

8. How do you classify the operations ? **10**

9. a) What are the general guidelines for process selection ? Explain. **5**

   b) Explain in detail selection of tooling. **5**

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SLR-VB – 110

Seat No.	

Set R

B.E. (Mechanical) (Part – I) Examination, 2017
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Monday, 8-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Question Number **1, 2** and **6** are **compulsory**.*
*2) Answer **any two full** questions from the remaining in **each** Section.*
*3) Figures to right indicate **full** marks.*
*4) Make **suitable** assumptions, if required and state them **clearly**.*
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. A) Choose the correct answers : **(1×10=10)**

1) In process type of layout all machines are in
A) In-line B) In group
C) In random D) Fixed position

2) Which of the following products is not continuous/process mfg. system ?
A) Cars B) Fertilizer
C) Petrochemical D) Steel

3) The flexibility of operations is achieved in
A) SPM B) GPM C) Automats D) All of above

4) Operation that bring raw part out of "rough" is
A) Major operation B) Originating operation
C) Qualifying operation D) Auxiliary operation

P.T.O.

5) Standard type of each option is decided by
   A) Product Engineer B) Process Engineer
   C) Time study Engineer D) Method Engineer

6) Which of the following departments is the heart of organisation ?
   A) Marketing Engineering B) Tool Room
   C) Production Engineering D) Process Engineering

7) Which of the following departments employ process picture ?
   A) Production department B) Marketing department
   C) Design department D) Inspection department

8) In process picture locator is considered as
   A) Cube B) Triangle C) Cone D) Pyramid

9) The documents released by process engineering departments are
   A) Machine tool used B) Route sheet
   C) Sequence of operation D) All of above

10) Which of the following are the causes of tolerance stack ?
   A) Product design B) Inspection method
   C) Tooling D) Machines

B) Match the pair : **10**

a) Forging of blank	1) Principal process operation	**5**
b) Machining of spur gear on milling	2) Major operation	
c) Keyway cutting on slotting	3) Auxiliary operation	
d) Heat treatment of gear	4) Supporting operation	
e) Inspection, packaging and dispatch	5) Basic process operation	
f) Locating surface	6) Qualifying operation	

a) Design tolerance stack	1) Process engineer	**2**
b) Process tolerance stack	2) Product engineer	

a) Job production	1) Capstan lathe	**3**
b) Batch production	2) Automatic lathe	
c) Mass production	3) Centre lathe	

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SLR-VB – 110

Seat No.	

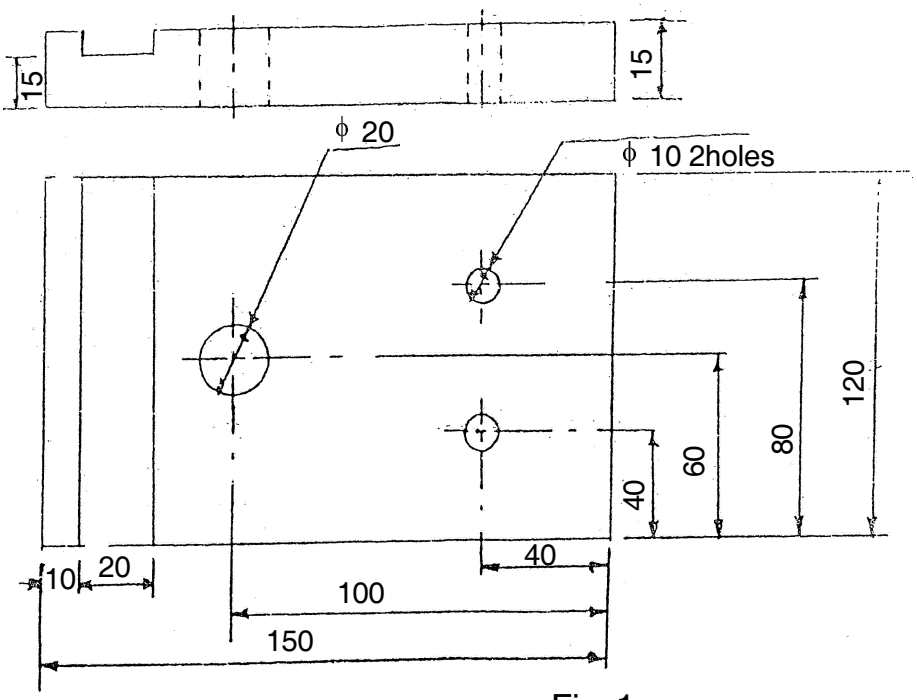
B.E. (Mechanical) (Part – I) Examination, 2017
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. **2** and Q. **6** are **compuslory**.*
*2) Solve **any 2** questions from **each** Section.*

SECTION – I

2. Prepare a process plan for manufacturing the component in Fig. 1 w.r.t. data supplied there in along following lines.
   A) Route sheet.
   B) Operations list indicating sequence of operation indicating machine selected, holding methods, tool specifications and machining parameters per set up.
   C) Gauges and or inspection methods and instruments. **20**



MH – M.S tolerances on m/cned dimensions are ± 0.1. All dimensions are in mm Production – job type

Fig. 1

3. a) Explain in detail characteristics of the manufacturing system. **5**
   b) Write a note on part print analysis. **5**

Set R

4. Explain the position and function of product and process engineer in the organization. **10**

5. a) What are the documents released by the product and process engineering departments ? **5**

   b) What are the general guidelines for manual process ? **5**

SECTION – II

6. Draw the process picture sheet for any four operations for manufacturing the component in Fig. 1 w.r.t. sequence. Use standard symbols for locating, clamping along with material removal. **20**

7. a) Explain in detail selection criterion for GPM and SPM. **5**

   b) What are the technical considerations for equipment selection ? Explain. **5**

8. How do you classify the operations ? **10**

9. a) What are the general guidelines for process selection ? Explain. **5**

   b) Explain in detail selection of tooling. **5**

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SLR-VB – 110

Seat No.	

Set S

B.E. (Mechanical) (Part – I) Examination, 2017
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Monday, 8-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Question Number **1, 2** and **6** are **compulsory**.*
*2) Answer **any two full** questions from the remaining in **each** Section.*
*3) Figures to right indicate **full** marks.*
*4) Make **suitable** assumptions, if required and state them **clearly**.*
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. A) Match the pair : **10**

a) Forging of blank	1) Principal process operation	**5**
b) Machining of spur gear on milling	2) Major operation	
c) Keyway cutting on slotting	3) Auxiliary operation	
d) Heat treatment of gear	4) Supporting operation	
e) Inspection, packaging and dispatch	5) Basic process operation	
f) Locating surface	6) Qualifying operation	

a) Design tolerance stack	1) Process engineer	**2**
b) Process tolerance stack	2) Product engineer	

a) Job production	1) Capstan lathe	**3**
b) Batch production	2) Automatic lathe	
c) Mass production	3) Centre lathe	

P.T.O.

B) Choose the correct answers : **(1×10=10)**

1) Standard type of each option is decided by
   A) Product Engineer B) Process Engineer
   C) Time study Engineer D) Method Engineer

2) Which of the following departments is the heart of organisation ?
   A) Marketing Engineering B) Tool Room
   C) Production Engineering D) Process Engineering

3) In process type of layout all machines are in
   A) In-line B) In group C) In random D) Fixed position

4) Which of the following products is not continuous/process mfg. system ?
   A) Cars B) Fertilizer
   C) Petrochemical D) Steel

5) The documents released by process engineering departments are
   A) Machine tool used B) Route sheet
   C) Sequence of operation D) All of above

6) Which of the following are the causes of tolerance stack ?
   A) Product design B) Inspection method
   C) Tooling D) Machines

7) The flexibility of operations is achieved in
   A) SPM B) GPM C) Automats D) All of above

8) Operation that bring raw part out of “rough” is
   A) Major operation B) Originating operation
   C) Qualifying operation D) Auxiliary operation

9) Which of the following departments employ process picture ?
   A) Production department B) Marketing department
   C) Design department D) Inspection department

10) In process picture locator is considered as
   A) Cube B) Triangle C) Cone D) Pyramid

SLR-VB – 110

Seat No.	

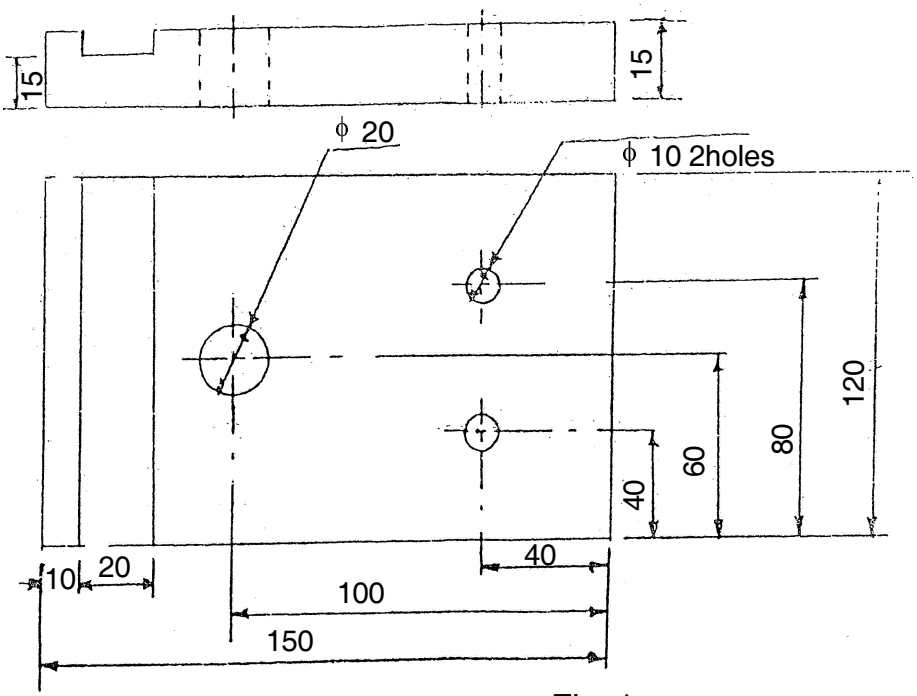
B.E. (Mechanical) (Part – I) Examination, 2017
PROCESS ENGINEERING (Professional Elective – III)

Day and Date : Monday, 8-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. **2** and Q. **6** are **compuslory**.*
*2) Solve **any 2** questions from **each** Section.*

SECTION – I

2. Prepare a process plan for manufacturing the component in Fig. 1 w.r.t. data supplied there in along following lines.
   A) Route sheet.
   B) Operations list indicating sequence of operation indicating machine selected, holding methods, tool specifications and machining parameters per set up.
   C) Gauges and or inspection methods and instruments. **20**



MH – M.S tolerances on m/cned dimensions are ± 0.1. All dimensions are in mm Production – job type

Fig. 1

3. a) Explain in detail characteristics of the manufacturing system. **5**
   b) Write a note on part print analysis. **5**

Set S

4. Explain the position and function of product and process engineer in the organization. **10**

5. a) What are the documents released by the product and process engineering departments ? **5**

   b) What are the general guidelines for manual process ? **5**

SECTION – II

6. Draw the process picture sheet for any four operations for manufacturing the component in Fig. 1 w.r.t. sequence. Use standard symbols for locating, clamping along with material removal. **20**

7. a) Explain in detail selection criterion for GPM and SPM. **5**

   b) What are the technical considerations for equipment selection ? Explain. **5**

8. How do you classify the operations ? **10**

9. a) What are the general guidelines for process selection ? Explain. **5**

   b) Explain in detail selection of tooling. **5**

———————

SLR-VB – 111

Seat No.	

Set P

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : SUGAR ENGINEERING

Day and Date : Tuesday, 9-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Answer* ***any two*** *questions from* ***each*** *Section*
4) *Figure to the* ***right*** *indicates* ***full*** *marks.*
5) *Use of scientific calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) The function of cane knives
   a) Unloading of cane
   b) Equal distribution of the cane
   c) To supply the cane to the mill in very short and small pieces
   d) Cutting the cane in to fine pieces

2) Location of the fibrizer is
   a) After the cane kicker and before the cane knives
   b) After the cane knives and before the first mill
   c) After the first mill and before the boiler
   d) None of the above

3) The object of chevron grooves
   a) Extraction of juice
   b) For proper mill setting
   c) Improving the feeding of the bagasse
   d) Proper engagement of rollers

4) To overcome the reabsorption of juice the roller used in the mill is
   a) Underfeed roller
   b) Toothed roller pressure feeder
   c) Lotus roller
   d) Discharge roller

5) Mill setting decreases from
   a) Last mill to first mill
   b) Fibrizer to first mill
   c) From first mill to last mill
   d) None of the above

6) Purpose of mill sanitation
   a) Weighing of juice
   b) Increase the rate of juice extraction
   c) For proper imbibition
   d) To minimize the drop of juice purity between crushed juice and mixed juice

P.T.O.

7) If condensate of juice heater is not removed
   a) Water is evaporated
   b) Heater starts vibrating
   c) Mixed in juice
   d) None of the above

8) Tubes of the evaporator vessel are made of
   a) Steel and cast iron
   b) Brass and bronze
   c) Steel or brass
   d) None of the above

9) Clear juice heater is used for
   a) To increase the temperature of the juice up to the boiling point
   b) Reduce the temperature of the juice upto 10°C
   c) Heating the raw juice
   d) To increase the brix of the juice

10) Rotary vacuum filter is used for
   a) To apply pressure on the surface of the filter
   b) Sulphitation of the juice
   c) Separation of juice from mud
   d) Filtration of juice

11) In this phase there is spontaneous formation of sugar crystal
   a) Saturated phase
   b) Unsaturated phase
   c) Metastable phase
   d) Labile phase

12) False grain and conglomerates formed due to
   a) Lack of cooling of massecuit
   b) Lack of additional syrup and molasses
   c) Lack of regular contact of steam and water
   d) None of the above

13) Mother liquor separated from sugar crystals contained in massecuit is called
   a) Massecuit b) Strike c) Seed d) Molasses

14) To bring the whiteness to the sugar the procedure required is
   a) Pan boiling
   b) Graining
   c) Syrup sulphitation
   d) None of the above

15) The problem associated with continuous centrifugal machine
   a) Conglomerates b) False grain c) Crystal breakage d) Uniform crystal

16) Sugar starts detoriates if safety factor
   a) Higher than 0.33 b) Lower than 0.25 c) Lower than 0.10 d) None of the above

17) In rotary dryer hot air and sugar flows in
   a) Same direction
   b) Counter current direction
   c) Bottom direction
   d) All the above

18) Gravity factor for 'A' massecuit is
   a) 1200 to 1500 b) 2000 to 2800 c) 600 to 800 d) 200 to 300

19) Sugar conveyor widely used in the sugar industry is
   a) Belt conveyor
   b) Grass hopper conveyor
   c) Screw conveyor
   d) None of the above

20) In this water treatment organic matter breaks down in to acids and alcohols without dissolved oxygen
   a) Aerobic type
   b) Screening type
   c) Anaerobic water treatment
   d) None of the above

SLR-VB – 111

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : SUGAR ENGINEERING

Day and Date : Tuesday, 9-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any two** questions from **each** Section*
*2) Figure to the **right** indicates **full** marks.*
*3) Use of scientific calculator is **allowed**.*

SECTION – I

2. a) Discuss cane kicker and cane leveler. **7**

   b) Explain mill imbibition system on mill. **7**

   c) Discuss pressure in milling with neat sketch. **6**

3. a) Explain juice sulphitation with neat sketch. **7**

   b) Explain the operation of multiple effect evaporator with neat sketch. **7**

   c) What is entrainment in quadriple bodies ? Discuss two entrainment separators. **6**

4. Write short notes on (**any four**) : **(4×5=20)**

   a) Roller grooving.

   b) Arcing of rollers.

   c) Lotus roller.

   d) Clear juice heater.

   e) Vapour cell.

SECTION – II

5. a) Discuss juice clarifier with neat sketch. **7**

   b) Explain rotary vacuum filter. **7**

   c) Discuss syrup sulphiter with neat sketch. **6**

Set P

6. a) Explain vacuum pan with neat sketch. **7**

   b) Discuss three massecuit boiling scheme in vacuum pan. **7**

   c) Explain continuous centrifugal machine with sketch. **6**

7. Write short notes on (**any four**) : **(4×5=20)**

   a) Batch type centrifugal machine.

   b) Sugar crystal growth mechanism.

   c) Crystalliser.

   d) Industrial waste water treatment.

   e) Sugar drying and cooling.

SLR-VB – 111

Seat No.	

Set Q

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : SUGAR ENGINEERING

Day and Date : Tuesday, 9-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Answer* ***any two*** *questions from* ***each*** *Section*
4) *Figure to the* ***right*** *indicates* ***full*** *marks.*
5) *Use of scientific calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Sugar starts detoriates if safety factor
   a) Higher than 0.33 b) Lower than 0.25 c) Lower than 0.10 d) None of the above
2) In rotary dryer hot air and sugar flows in
   a) Same direction b) Counter current direction
   c) Bottom direction d) All the above
3) Gravity factor for 'A' massecuit is
   a) 1200 to 1500 b) 2000 to 2800 c) 600 to 800 d) 200 to 300
4) Sugar conveyor widely used in the sugar industry is
   a) Belt conveyor b) Grass hopper conveyor
   c) Screw conveyor d) None of the above
5) In this water treatment organic matter breaks down in to acids and alcohols without dissolved oxygen
   a) Aerobic type b) Screening type
   c) Anaerobic water treatment d) None of the above
6) The function of cane knives
   a) Unloading of cane
   b) Equal distribution of the cane
   c) To supply the cane to the mill in very short and small pieces
   d) Cutting the cane in to fine pieces
7) Location of the fibrizer is
   a) After the cane kicker and before the cane knives
   b) After the cane knives and before the first mill
   c) After the first mill and before the boiler
   d) None of the above

P.T.O.

8) The object of chevron grooves
   a) Extraction of juice
   b) For proper mill setting
   c) Improving the feeding of the bagasse
   d) Proper engagement of rollers

9) To overcome the reabsorption of juice the roller used in the mill is
   a) Underfeed roller
   b) Toothed roller pressure feeder
   c) Lotus roller
   d) Discharge roller

10) Mill setting decreases from
   a) Last mill to first mill
   b) Fibrizer to first mill
   c) From first mill to last mill
   d) None of the above

11) Purpose of mill sanitation
   a) Weighing of juice
   b) Increase the rate of juice extraction
   c) For proper imbibition
   d) To minimize the drop of juice purity between crushed juice and mixed juice

12) If condensate of juice heater is not removed
   a) Water is evaporated
   b) Heater starts vibrating
   c) Mixed in juice
   d) None of the above

13) Tubes of the evaporator vessel are made of
   a) Steel and cast iron
   b) Brass and bronze
   c) Steel or brass
   d) None of the above

14) Clear juice heater is used for
   a) To increase the temperature of the juice up to the boiling point
   b) Reduce the temperature of the juice upto 10°C
   c) Heating the raw juice
   d) To increase the brix of the juice

15) Rotary vacuum filter is used for
   a) To apply pressure on the surface of the filter
   b) Sulphitation of the juice
   c) Separation of juice from mud
   d) Filtration of juice

16) In this phase there is spontaneous formation of sugar crystal
   a) Saturated phase
   b) Unsaturated phase
   c) Metastable phase
   d) Labile phase

17) False grain and conglomerates formed due to
   a) Lack of cooling of massecuit
   b) Lack of additional syrup and molasses
   c) Lack of regular contact of steam and water
   d) None of the above

18) Mother liquor separated from sugar crystals contained in massecuit is called
   a) Massecuit b) Strike c) Seed d) Molasses

19) To bring the whiteness to the sugar the procedure required is
   a) Pan boiling
   b) Graining
   c) Syrup sulphitation
   d) None of the above

20) The problem associated with continuous centrifugal machine
   a) Conglomerates b) False grain c) Crystal breakage d) Uniform crystal

SLR-VB – 111

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : SUGAR ENGINEERING

Day and Date : Tuesday, 9-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any two** questions from **each** Section*
*2) Figure to the **right** indicates **full** marks.*
*3) Use of scientific calculator is **allowed**.*

SECTION – I

2. a) Discuss cane kicker and cane leveler. **7**

   b) Explain mill imbibition system on mill. **7**

   c) Discuss pressure in milling with neat sketch. **6**

3. a) Explain juice sulphitation with neat sketch. **7**

   b) Explain the operation of multiple effect evaporator with neat sketch. **7**

   c) What is entrainment in quadriple bodies ? Discuss two entrainment separators. **6**

4. Write short notes on (**any four**) : **(4×5=20)**

   a) Roller grooving.

   b) Arcing of rollers.

   c) Lotus roller.

   d) Clear juice heater.

   e) Vapour cell.

SECTION – II

5. a) Discuss juice clarifier with neat sketch. **7**

   b) Explain rotary vacuum filter. **7**

   c) Discuss syrup sulphiter with neat sketch. **6**

Set Q

6. a) Explain vacuum pan with neat sketch. **7**

   b) Discuss three massecuit boiling scheme in vacuum pan. **7**

   c) Explain continuous centrifugal machine with sketch. **6**

7. Write short notes on (**any four**) : **(4×5=20)**

   a) Batch type centrifugal machine.

   b) Sugar crystal growth mechanism.

   c) Crystalliser.

   d) Industrial waste water treatment.

   e) Sugar drying and cooling.

SLR-VB – 111

Seat No.	

Set **R**

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : SUGAR ENGINEERING

Day and Date : Tuesday, 9-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Answer* ***any two*** *questions from* ***each*** *Section*
4) *Figure to the* ***right*** *indicates* ***full*** *marks.*
5) *Use of scientific calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) In this phase there is spontaneous formation of sugar crystal
   a) Saturated phase b) Unsaturated phase
   c) Metastable phase d) Labile phase

2) False grain and conglomerates formed due to
   a) Lack of cooling of massecuit
   b) Lack of additional syrup and molasses
   c) Lack of regular contact of steam and water
   d) None of the above

3) Mother liquor separated from sugar crystals contained in massecuit is called
   a) Massecuit b) Strike c) Seed d) Molasses

4) To bring the whiteness to the sugar the procedure required is
   a) Pan boiling b) Graining
   c) Syrup sulphitation d) None of the above

5) The problem associated with continuous centrifugal machine
   a) Conglomerates b) False grain c) Crystal breakage d) Uniform crystal

6) Sugar starts detoriates if safety factor
   a) Higher than 0.33 b) Lower than 0.25 c) Lower than 0.10 d) None of the above

7) In rotary dryer hot air and sugar flows in
   a) Same direction b) Counter current direction
   c) Bottom direction d) All the above

8) Gravity factor for 'A' massecuit is
   a) 1200 to 1500 b) 2000 to 2800 c) 600 to 800 d) 200 to 300

9) Sugar conveyor widely used in the sugar industry is
   a) Belt conveyor b) Grass hopper conveyor
   c) Screw conveyor d) None of the above

10) In this water treatment organic matter breaks down in to acids and alcohols without dissolved oxygen
   a) Aerobic type
   b) Screening type
   c) Anaerobic water treatment
   d) None of the above

11) The function of cane knives
   a) Unloading of cane
   b) Equal distribution of the cane
   c) To supply the cane to the mill in very short and small pieces
   d) Cutting the cane in to fine pieces

12) Location of the fibrizer is
   a) After the cane kicker and before the cane knives
   b) After the cane knives and before the first mill
   c) After the first mill and before the boiler
   d) None of the above

13) The object of chevron grooves
   a) Extraction of juice
   b) For proper mill setting
   c) Improving the feeding of the bagasse
   d) Proper engagement of rollers

14) To overcome the reabsorption of juice the roller used in the mill is
   a) Underfeed roller
   b) Toothed roller pressure feeder
   c) Lotus roller
   d) Discharge roller

15) Mill setting decreases from
   a) Last mill to first mill
   b) Fibrizer to first mill
   c) From first mill to last mill
   d) None of the above

16) Purpose of mill sanitation
   a) Weighing of juice
   b) Increase the rate of juice extraction
   c) For proper imbibition
   d) To minimize the drop of juice purity between crushed juice and mixed juice

17) If condensate of juice heater is not removed
   a) Water is evaporated
   b) Heater starts vibrating
   c) Mixed in juice
   d) None of the above

18) Tubes of the evaporator vessel are made of
   a) Steel and cast iron
   b) Brass and bronze
   c) Steel or brass
   d) None of the above

19) Clear juice heater is used for
   a) To increase the temperature of the juice up to the boiling point
   b) Reduce the temperature of the juice upto 10°C
   c) Heating the raw juice
   d) To increase the brix of the juice

20) Rotary vacuum filter is used for
   a) To apply pressure on the surface of the filter
   b) Sulphitation of the juice
   c) Separation of juice from mud
   d) Filtration of juice

SLR-VB – 111

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : SUGAR ENGINEERING

Day and Date : Tuesday, 9-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any two** questions from **each** Section*
*2) Figure to the **right** indicates **full** marks.*
*3) Use of scientific calculator is **allowed**.*

SECTION – I

2. a) Discuss cane kicker and cane leveler. **7**

   b) Explain mill imbibition system on mill. **7**

   c) Discuss pressure in milling with neat sketch. **6**

3. a) Explain juice sulphitation with neat sketch. **7**

   b) Explain the operation of multiple effect evaporator with neat sketch. **7**

   c) What is entrainment in quadriple bodies ? Discuss two entrainment separators. **6**

4. Write short notes on (**any four**) : **(4×5=20)**

   a) Roller grooving.

   b) Arcing of rollers.

   c) Lotus roller.

   d) Clear juice heater.

   e) Vapour cell.

SECTION – II

5. a) Discuss juice clarifier with neat sketch. **7**

   b) Explain rotary vacuum filter. **7**

   c) Discuss syrup sulphiter with neat sketch. **6**

Set R

6. a) Explain vacuum pan with neat sketch. **7**

   b) Discuss three massecuit boiling scheme in vacuum pan. **7**

   c) Explain continuous centrifugal machine with sketch. **6**

7. Write short notes on (**any four**) : **(4×5=20)**

   a) Batch type centrifugal machine.

   b) Sugar crystal growth mechanism.

   c) Crystalliser.

   d) Industrial waste water treatment.

   e) Sugar drying and cooling.

SLR-VB – 111

Seat No.	

Set **S**

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : SUGAR ENGINEERING

Day and Date : Tuesday, 9-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Answer* ***any two*** *questions from* ***each*** *Section*
4) *Figure to the* ***right*** *indicates* ***full*** *marks.*
5) *Use of scientific calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Purpose of mill sanitation
   a) Weighing of juice
   b) Increase the rate of juice extraction
   c) For proper imbibition
   d) To minimize the drop of juice purity between crushed juice and mixed juice

2) If condensate of juice heater is not removed
   a) Water is evaporated b) Heater starts vibrating
   c) Mixed in juice d) None of the above

3) Tubes of the evaporator vessel are made of
   a) Steel and cast iron b) Brass and bronze
   c) Steel or brass d) None of the above

4) Clear juice heater is used for
   a) To increase the temperature of the juice up to the boiling point
   b) Reduce the temperature of the juice upto 10°C
   c) Heating the raw juice
   d) To increase the brix of the juice

5) Rotary vacuum filter is used for
   a) To apply pressure on the surface of the filter
   b) Sulphitation of the juice
   c) Separation of juice from mud
   d) Filtration of juice

6) In this phase there is spontaneous formation of sugar crystal
   a) Saturated phase b) Unsaturated phase
   c) Metastable phase d) Labile phase

P.T.O.

7) False grain and conglomerates formed due to
   a) Lack of cooling of massecuit
   b) Lack of additional syrup and molasses
   c) Lack of regular contact of steam and water
   d) None of the above

8) Mother liquor separated from sugar crystals contained in massecuit is called
   a) Massecuit b) Strike c) Seed d) Molasses

9) To bring the whiteness to the sugar the procedure required is
   a) Pan boiling b) Graining
   c) Syrup sulphitation d) None of the above

10) The problem associated with continuous centrifugal machine
   a) Conglomerates b) False grain c) Crystal breakage d) Uniform crystal

11) Sugar starts detoriates if safety factor
   a) Higher than 0.33 b) Lower than 0.25 c) Lower than 0.10 d) None of the above

12) In rotary dryer hot air and sugar flows in
   a) Same direction b) Counter current direction
   c) Bottom direction d) All the above

13) Gravity factor for 'A' massecuit is
   a) 1200 to 1500 b) 2000 to 2800 c) 600 to 800 d) 200 to 300

14) Sugar conveyor widely used in the sugar industry is
   a) Belt conveyor b) Grass hopper conveyor
   c) Screw conveyor d) None of the above

15) In this water treatment organic matter breaks down in to acids and alcohols without dissolved oxygen
   a) Aerobic type b) Screening type
   c) Anaerobic water treatment d) None of the above

16) The function of cane knives
   a) Unloading of cane
   b) Equal distribution of the cane
   c) To supply the cane to the mill in very short and small pieces
   d) Cutting the cane in to fine pieces

17) Location of the fibrizer is
   a) After the cane kicker and before the cane knives
   b) After the cane knives and before the first mill
   c) After the first mill and before the boiler
   d) None of the above

18) The object of chevron grooves
   a) Extraction of juice b) For proper mill setting
   c) Improving the feeding of the bagasse d) Proper engagement of rollers

19) To overcome the reabsorption of juice the roller used in the mill is
   a) Underfeed roller b) Toothed roller pressure feeder
   c) Lotus roller d) Discharge roller

20) Mill setting decreases from
   a) Last mill to first mill b) Fibrizer to first mill
   c) From first mill to last mill d) None of the above

SLR-VB – 111

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : SUGAR ENGINEERING

Day and Date : Tuesday, 9-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any two** questions from **each** Section*
*2) Figure to the **right** indicates **full** marks.*
*3) Use of scientific calculator is **allowed**.*

SECTION – I

2. a) Discuss cane kicker and cane leveler. **7**

   b) Explain mill imbibition system on mill. **7**

   c) Discuss pressure in milling with neat sketch. **6**

3. a) Explain juice sulphitation with neat sketch. **7**

   b) Explain the operation of multiple effect evaporator with neat sketch. **7**

   c) What is entrainment in quadriple bodies ? Discuss two entrainment separators. **6**

4. Write short notes on (**any four**) : **(4×5=20)**

   a) Roller grooving.

   b) Arcing of rollers.

   c) Lotus roller.

   d) Clear juice heater.

   e) Vapour cell.

SECTION – II

5. a) Discuss juice clarifier with neat sketch. **7**

   b) Explain rotary vacuum filter. **7**

   c) Discuss syrup sulphiter with neat sketch. **6**

Set S

6. a) Explain vacuum pan with neat sketch. **7**

   b) Discuss three massecuit boiling scheme in vacuum pan. **7**

   c) Explain continuous centrifugal machine with sketch. **6**

7. Write short notes on (**any four**) : **(4×5=20)**

   a) Batch type centrifugal machine.

   b) Sugar crystal growth mechanism.

   c) Crystalliser.

   d) Industrial waste water treatment.

   e) Sugar drying and cooling.

SLR-VB – 112

Seat No.	

Set **P**

B.E. (Mechanical) (Part – I) Examination, 2017
(Elective – I) TEXTILE ENGINEERING

Day and Date : Tuesday, 9-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of non-programmable calculator, stream table, psychometric chart is* ***allowed****.*
3) ***Assume*** *suitable data* ***wherever*** *necessary.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Removal of short fibre takes place in
a) Blow room b) Carding c) Draw frame d) Combing

2) Short fibres in the yarn increases
a) Length of yarn b) Elongation of yarn
c) Hairiness of yarn d) Strength of yarn

3) Jacquard mechanism is used for producing
a) Designs having warp way repeat upto 24 ends
b) Designs having weft way repeat upto 24 picks
c) Designs having warp way repeat upto 400 ends
d) Designs having weft way repeat upto 400 ends

4) 4×1 Drop Box mechanism has limitation of inserting _____ picks.
a) 4 b) Odd c) Even d) 1

5) Bleaching process is used for
a) Removal of dust from fabric b) Improvising air permeability
c) Improvising whiteness of fabric d) Removal of size paste

6) Which following drive will have minimum belt slippage ?
a) Flat belt b) Rope belt c) Vee belt d) Toothed belt

7) Ratchet gear is sed for
   a) Intermittent drive
   b) Continuous drive
   c) Changing rotary drive to reciprocating
   d) Belt drive

8) The “End” belongs to
   a) Warp b) Weft c) Tex d) Denier

9) 20 Tex = _____ English count.
   a) 29.53 b) 290.53 c) 180.3 d) 18.03

10) Silk fibre belongs to
   a) Synthetic fibre b) Plant fibre c) Animal fibre d) Mineral fibre

11) Tick the correct statement from the following
   a) Warp crimp is generally more than weft crimp
   b) Weft crimp is generally more than warp crimp
   c) Warp and weft crimp are generally same
   d) No any crimp trend is found in a fabric

12) Preventive maintenance will
   a) Reduce brake downs
   b) Increase cost of production
   c) Reduce the efficiency of the machine
   d) Increase the burden on maintenance department

13) In which shuttleless weaving technology torsion rod is used for picking ?
   a) Projectile b) Air jet c) Water jet d) Multiphase

14) Name the machine where ends are passed through heald wires and reed
   a) Winding b) Warping c) Sizing d) Drawing-in

15) Fabric absorbency can be improved by
   a) Finishing b) Printing c) Mercerizing d) Bleaching

16) Name the process of fabric forming where fibres are converted into fabric without yarn
   a) Weaving b) Non woven c) Knitting d) Braiding

17) Which type of bearing is used in modern draw frame top rollers ?
   a) Ball Bearing b) Roller Bearing c) Bush Bearing d) Needle Bearing

18) Cotton seeds are removed in
   a) Pressing b) Ginning c) Combing d) Warping

19) T shirts are produced by the fabric produced by
   a) Weaving process b) Knitting process
   c) Nonwoven process d) Braiding process

20) Jacquard mechanism is popularly used for manufacturing of
   a) Poplin fabric b) Chaddar fabric c) T shirt fabric d) Towel

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SLR-VB – 112

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
(Elective – I) TEXTILE ENGINEERING

Day and Date : Tuesday, 9-5-2017 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions: *1) Attempt **any two** questions from **each** Section.*
*2) **Use** of non-programmable calculator, stream table, psychometric chart is **allowed**.*
*3) **Assume** suitable data **wherever** necessary.*

SECTION – I

2. a) Which processes are involved in producing warp way stripe fabric ? Write the objects of each with their sequence. **8**

   b) With a line diagram explain the working principle of tappet shedding mechanism. **7**

   c) Explain the knitting process of fabric forming. **5**

3. a) Explain how the opening and cleaning is done of the cotton fibres. **8**

   b) Explain the twisting mechanism in ring frame. **7**

   c) Calculate the production of a loom in meters per shift of 8 hours running at 250 rpm and producing fabric of 20 picks per cm and efficiency of 80%. **5**

4. a) give the process flow chart for carded yarn with the objects of each process. **8**

   b) Give the essential and desirable properties of a textile fibre. **7**

   c) The weight of cotton yarn on ring bobbin of 30 Tex is 70 grams. What will be the length of yarn in meters ? How much will be its denier ? **5**

SECTION – II

5. a) Give a detail account of different types of mechanical drives used in textile. **8**

   b) What is the function of the clutch ? What are its types ? Explain any one used in textile industry. **7**

   c) Why lubrication is necessary for any machine ? What are different types of lubricants used for textile machines ? **5**

6. a) What is the maintenance schedule ? How this schedule is prepared for textile machine ? **8**

   b) With suitable example give the applications of different types of bearings used on textile machines. **7**

   c) What is the object of brake motion on a plain loom. **5**

7. a) What are the advantages of the shuttleless looms ? **8**

   b) Explain the working principle of rapier weaving machine. **7**

   c) Give the classification of weaving machines. **5**

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SLR-VB – 112

Seat No.	

Set **Q**

B.E. (Mechanical) (Part – I) Examination, 2017
(Elective – I) TEXTILE ENGINEERING

Day and Date : Tuesday, 9-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of non-programmable calculator, stream table, psychometric chart is* ***allowed****.*
3) ***Assume*** *suitable data* ***wherever*** *necessary.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Name the process of fabric forming where fibres are converted into fabric without yarn
a) Weaving b) Non woven c) Knitting d) Braiding

2) Which type of bearing is used in modern draw frame top rollers ?
a) Ball Bearing b) Roller Bearing c) Bush Bearing d) Needle Bearing

3) Cotton seeds are removed in
a) Pressing b) Ginning c) Combing d) Warping

4) T shirts are produced by the fabric produced by
a) Weaving process b) Knitting process
c) Nonwoven process d) Braiding process

5) Jacquard mechanism is popularly used for manufacturing of
a) Poplin fabric b) Chaddar fabric c) T shirt fabric d) Towel

6) Removal of short fibre takes place in
a) Blow room b) Carding c) Draw frame d) Combing

7) Short fibres in the yarn increases
a) Length of yarn b) Elongation of yarn
c) Hairiness of yarn d) Strength of yarn

8) Jacquard mechanism is used for producing
   a) Designs having warp way repeat upto 24 ends
   b) Designs having weft way repeat upto 24 picks
   c) Designs having warp way repeat upto 400 ends
   d) Designs having weft way repeat upto 400 ends

9) 4×1 Drop Box mechanism has limitation of inserting _____ picks.
   a) 4 b) Odd c) Even d) 1

10) Bleaching process is used for
   a) Removal of dust from fabric b) Improvising air permeability
   c) Improvising whiteness of fabric d) Removal of size paste

11) Which following drive will have minimum belt slippage ?
   a) Flat belt b) Rope belt c) Vee belt d) Toothed belt

12) Ratchet gear is sed for
   a) Intermittent drive
   b) Continuous drive
   c) Changing rotary drive to reciprocating
   d) Belt drive

13) The “End” belongs to
   a) Warp b) Weft c) Tex d) Denier

14) 20 Tex = _____ English count.
   a) 29.53 b) 290.53 c) 180.3 d) 18.03

15) Silk fibre belongs to
   a) Synthetic fibre b) Plant fibre c) Animal fibre d) Mineral fibre

16) Tick the correct statement from the following
   a) Warp crimp is generally more than weft crimp
   b) Weft crimp is generally more than warp crimp
   c) Warp and weft crimp are generally same
   d) No any crimp trend is found in a fabric

17) Preventive maintenance will
   a) Reduce brake downs
   b) Increase cost of production
   c) Reduce the efficiency of the machine
   d) Increase the burden on maintenance department

18) In which shuttleless weaving technology torsion rod is used for picking ?
   a) Projectile b) Air jet c) Water jet d) Multiphase

19) Name the machine where ends are passed through heald wires and reed
   a) Winding b) Warping c) Sizing d) Drawing-in

20) Fabric absorbency can be improved by
   a) Finishing b) Printing c) Mercerizing d) Bleaching

_____

SLR-VB – 112

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
(Elective – I) TEXTILE ENGINEERING

Day and Date : Tuesday, 9-5-2017 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions: *1) Attempt **any two** questions from **each** Section.*
*2) **Use** of non-programmable calculator, stream table, psychometric chart is **allowed**.*
*3) **Assume** suitable data **wherever** necessary.*

SECTION – I

2. a) Which processes are involved in producing warp way stripe fabric ? Write the objects of each with their sequence. **8**

   b) With a line diagram explain the working principle of tappet shedding mechanism. **7**

   c) Explain the knitting process of fabric forming. **5**

3. a) Explain how the opening and cleaning is done of the cotton fibres. **8**

   b) Explain the twisting mechanism in ring frame. **7**

   c) Calculate the production of a loom in meters per shift of 8 hours running at 250 rpm and producing fabric of 20 picks per cm and efficiency of 80%. **5**

4. a) give the process flow chart for carded yarn with the objects of each process. **8**

   b) Give the essential and desirable properties of a textile fibre. **7**

   c) The weight of cotton yarn on ring bobbin of 30 Tex is 70 grams. What will be the length of yarn in meters ? How much will be its denier ? **5**

SECTION – II

5. a) Give a detail account of different types of mechanical drives used in textile. **8**

   b) What is the function of the clutch ? What are its types ? Explain any one used in textile industry. **7**

   c) Why lubrication is necessary for any machine ? What are different types of lubricants used for textile machines ? **5**

6. a) What is the maintenance schedule ? How this schedule is prepared for textile machine ? **8**

   b) With suitable example give the applications of different types of bearings used on textile machines. **7**

   c) What is the object of brake motion on a plain loom. **5**

7. a) What are the advantages of the shuttleless looms ? **8**

   b) Explain the working principle of rapier weaving machine. **7**

   c) Give the classification of weaving machines. **5**

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SLR-VB – 112

Seat No.	

Set R

B.E. (Mechanical) (Part – I) Examination, 2017
(Elective – I) TEXTILE ENGINEERING

Day and Date : Tuesday, 9-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of non-programmable calculator, stream table, psychometric chart is* ***allowed****.*
3) ***Assume*** *suitable data* ***wherever*** *necessary.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Tick the correct statement from the following
   a) Warp crimp is generally more than weft crimp
   b) Weft crimp is generally more than warp crimp
   c) Warp and weft crimp are generally same
   d) No any crimp trend is found in a fabric

2) Preventive maintenance will
   a) Reduce brake downs
   b) Increase cost of production
   c) Reduce the efficiency of the machine
   d) Increase the burden on maintenance department

3) In which shuttleless weaving technology torsion rod is used for picking ?
   a) Projectile b) Air jet c) Water jet d) Multiphase

4) Name the machine where ends are passed through heald wires and reed
   a) Winding b) Warping c) Sizing d) Drawing-in

5) Fabric absorbency can be improved by
   a) Finishing b) Printing c) Mercerizing d) Bleaching

6) Name the process of fabric forming where fibres are converted into fabric without yarn
   a) Weaving b) Non woven c) Knitting d) Braiding

P.T.O.

7) Which type of bearing is used in modern draw frame top rollers ?
   a) Ball Bearing b) Roller Bearing c) Bush Bearing d) Needle Bearing

8) Cotton seeds are removed in
   a) Pressing b) Ginning c) Combing d) Warping

9) T shirts are produced by the fabric produced by
   a) Weaving process b) Knitting process
   c) Nonwoven process d) Braiding process

10) Jacquard mechanism is popularly used for manufacturing of
   a) Poplin fabric b) Chaddar fabric c) T shirt fabric d) Towel

11) Removal of short fibre takes place in
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   c) Designs having warp way repeat upto 400 ends
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14) 4×1 Drop Box mechanism has limitation of inserting _____ picks.
   a) 4 b) Odd c) Even d) 1

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   a) Removal of dust from fabric b) Improvising air permeability
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16) Which following drive will have minimum belt slippage ?
   a) Flat belt b) Rope belt c) Vee belt d) Toothed belt

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19) 20 Tex = _____ English count.
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20) Silk fibre belongs to
   a) Synthetic fibre b) Plant fibre c) Animal fibre d) Mineral fibre

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SLR-VB – 112

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
(Elective – I) TEXTILE ENGINEERING

Day and Date : Tuesday, 9-5-2017 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions: *1) Attempt **any two** questions from **each** Section.*
*2) **Use** of non-programmable calculator, stream table, psychometric chart is **allowed**.*
*3) **Assume** suitable data **wherever** necessary.*

SECTION – I

2. a) Which processes are involved in producing warp way stripe fabric ? Write the objects of each with their sequence. **8**

   b) With a line diagram explain the working principle of tappet shedding mechanism. **7**

   c) Explain the knitting process of fabric forming. **5**

3. a) Explain how the opening and cleaning is done of the cotton fibres. **8**

   b) Explain the twisting mechanism in ring frame. **7**

   c) Calculate the production of a loom in meters per shift of 8 hours running at 250 rpm and producing fabric of 20 picks per cm and efficiency of 80%. **5**

4. a) give the process flow chart for carded yarn with the objects of each process. **8**

   b) Give the essential and desirable properties of a textile fibre. **7**

   c) The weight of cotton yarn on ring bobbin of 30 Tex is 70 grams. What will be the length of yarn in meters ? How much will be its denier ? **5**

SECTION – II

5. a) Give a detail account of different types of mechanical drives used in textile. **8**

   b) What is the function of the clutch ? What are its types ? Explain any one used in textile industry. **7**

   c) Why lubrication is necessary for any machine ? What are different types of lubricants used for textile machines ? **5**

6. a) What is the maintenance schedule ? How this schedule is prepared for textile machine ? **8**

   b) With suitable example give the applications of different types of bearings used on textile machines. **7**

   c) What is the object of brake motion on a plain loom. **5**

7. a) What are the advantages of the shuttleless looms ? **8**

   b) Explain the working principle of rapier weaving machine. **7**

   c) Give the classification of weaving machines. **5**

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SLR-VB – 112

Seat No.	

Set **S**

B.E. (Mechanical) (Part – I) Examination, 2017
(Elective – I) TEXTILE ENGINEERING

Day and Date : Tuesday, 9-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) ***Use*** *of non-programmable calculator, stream table, psychometric chart is* ***allowed****.*
3) ***Assume*** *suitable data* ***wherever*** *necessary.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Which following drive will have minimum belt slippage ?
a) Flat belt b) Rope belt c) Vee belt d) Toothed belt

2) Ratchet gear is sed for
a) Intermittent drive
b) Continuous drive
c) Changing rotary drive to reciprocating
d) Belt drive

3) The "End" belongs to
a) Warp b) Weft c) Tex d) Denier

4) 20 Tex = _____ English count.
a) 29.53 b) 290.53 c) 180.3 d) 18.03

5) Silk fibre belongs to
a) Synthetic fibre b) Plant fibre c) Animal fibre d) Mineral fibre

6) Tick the correct statement from the following
a) Warp crimp is generally more than weft crimp
b) Weft crimp is generally more than warp crimp
c) Warp and weft crimp are generally same
d) No any crimp trend is found in a fabric

7) Preventive maintenance will
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9) Name the machine where ends are passed through heald wires and reed
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10) Fabric absorbency can be improved by
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11) Name the process of fabric forming where fibres are converted into fabric without yarn
   a) Weaving b) Non woven c) Knitting d) Braiding

12) Which type of bearing is used in modern draw frame top rollers ?
   a) Ball Bearing b) Roller Bearing c) Bush Bearing d) Needle Bearing

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19) 4×1 Drop Box mechanism has limitation of inserting _____ picks.
   a) 4 b) Odd c) Even d) 1

20) Bleaching process is used for
   a) Removal of dust from fabric b) Improvising air permeability
   c) Improvising whiteness of fabric d) Removal of size paste

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SLR-VB – 112

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
(Elective – I) TEXTILE ENGINEERING

Day and Date : Tuesday, 9-5-2017 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions: *1) Attempt **any two** questions from **each** Section.*
*2) **Use** of non-programmable calculator, stream table, psychometric chart is **allowed**.*
*3) **Assume** suitable data **wherever** necessary.*

SECTION – I

2. a) Which processes are involved in producing warp way stripe fabric ? Write the objects of each with their sequence. **8**

   b) With a line diagram explain the working principle of tappet shedding mechanism. **7**

   c) Explain the knitting process of fabric forming. **5**

3. a) Explain how the opening and cleaning is done of the cotton fibres. **8**

   b) Explain the twisting mechanism in ring frame. **7**

   c) Calculate the production of a loom in meters per shift of 8 hours running at 250 rpm and producing fabric of 20 picks per cm and efficiency of 80%. **5**

4. a) give the process flow chart for carded yarn with the objects of each process. **8**

   b) Give the essential and desirable properties of a textile fibre. **7**

   c) The weight of cotton yarn on ring bobbin of 30 Tex is 70 grams. What will be the length of yarn in meters ? How much will be its denier ? **5**

SECTION – II

5. a) Give a detail account of different types of mechanical drives used in textile. **8**

   b) What is the function of the clutch ? What are its types ? Explain any one used in textile industry. **7**

   c) Why lubrication is necessary for any machine ? What are different types of lubricants used for textile machines ? **5**

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   b) With suitable example give the applications of different types of bearings used on textile machines. **7**

   c) What is the object of brake motion on a plain loom. **5**

7. a) What are the advantages of the shuttleless looms ? **8**

   b) Explain the working principle of rapier weaving machine. **7**

   c) Give the classification of weaving machines. **5**

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SLR-VB – 113

Seat No.	

Set **P**

B.E. Mechanical (Part – I) Examination, 2017
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Tuesday, 9-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Answer* ***any two full*** *questions from* ***each*** *Section.*
4) *Figures to the* ***right*** *indicate* ***full*** *marks.*
5) *Make suitable assumptions, if required and state them* ***clearly****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) _____ is the drive to achieve a goal.
   a) Motivation b) Need for achievement
   c) Competency d) None of these

2) Which of the following is the short term finance ?
   a) Trade credit b) Lease finance c) Hire purchase d) Public deposit

3) Knowledge + Skill + Traits =
   a) Innovation b) Competency c) Skill d) Creativity

4) The capacity to develop new ideas, concepts and processes is known as
   a) Innovation b) Invention c) Skill d) Creativity

5) Which of the following risks is borne by the entrepreneur ?
   a) Financial risks b) Personal risks
   c) Psychological risks d) All of these

6) Which of the following is a psychological factor affecting entrepreneurial growth ?
   a) Legitimacy of entrepreneurship b) Social status
   c) Need for achievement d) None of these

7) _____ units provide inputs to other industries.
   a) Export b) Small c) Ancillary d) None of these

8) _____ is the financial and promotional assistance provided by the Govt. to the industries for boosting up industrial development in all regions particularly in backward areas.
   a) Seed capital b) Incentive c) Subsidy d) None of these

P.T.O.

9) _____ is the place where the required facilities and factory accommodation are provided by the government to the entrepreneurs to establish their industries there.
a) Industry b) Industrial estate c) Company d) None of these

10) _____ the process of collection, compilation and analysis of economic data for the purpose of finding out possible opportunities for investment.
a) Project screening b) Project appraisal
c) Project identification d) None

11) SWOT stands for strength, weakness, opportunity, and
a) Treat b) Threat c) Talent d) Team

12) Project formulation means _____ study.
a) Profitability b) Liquidity c) Feasibility d) Viability

13) _____ analysis is primarily concerned with the identification, quantification and evaluation of project resources.
a) Network b) Financial c) Techno-economic d) Input

14) _____ is a contract between the owner and user of the asset to use the asset for a consideration.
a) Venture capital b) Layered financing
c) Deferred credit d) Lease financing

15) The main object of project appraisal is
a) To find whether the project is technically feasible
b) To ascertain whether the project is financially feasible
c) To decide whether to accept or reject a project
d) To know whether the project is eco-friendly

16) _____ report is a document where in all the details obtained from technical analysis, financial analysis, profitability analysis etc. are put together.
a) Feasibility b) Project c) Both d) None

17) _____ analysis is concerned with the development of detailed work plan of the project and its time profile.
a) Techno-economic b) Network c) Financial d) Social cost-benefit

18) Technology developed within a country is called
a) Technology licensing b) Purchase of technology
c) Joint venture d) Indigenous technology

19) _____ skill relates to accounting and financing control, marketing, production, planning, inventory control and to manage people who work in the enterprise.
a) Communication b) Decision-making
c) Project development d) Management

20) Which of these is a social barrier to entrepreneurship ?
a) Low status b) Custom of people
c) Both d) None

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SLR-VB – 113

Seat No.	

B.E. Mechanical (Part – I) Examination, 2017
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Tuesday, 9-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any two full** questions from each Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make suitable assumptions, if required and state them **clearly**.*

SECTION – I

2. a) Explain concept of entrepreneur and entrepreneurship. **10**
   b) What are the characteristics and qualities of entrepreneur ? **10**

3. a) Write classification and types of entrepreneurs. **10**
   b) Explain evolution of entrepreneurship. **10**

4. a) Explain role of culture in entrepreneurial development. **10**
   b) Explain the problems faced by entrepreneur in detail. **10**

5. Write notes on :
   a) Franchising **10**
   b) EDP. **10**

SECTION – II

6. a) Explain SWOT analysis in entrepreneurship. **10**
   b) Explain sequential stages of project formulation. **10**

7. a) Explain sources and methods for idea generation. **10**
   b) Explain contents of project report. **10**

8. a) Explain importance of small enterprises in India. **10**
   b) Write steps in setting up a small unit in detail. **10**

9. Write notes on :
   a) Fixed capital. **10**
   b) Organizational structure. **10**

Set P

Set P

SLR-VB – 113

Seat No.	

Set **Q**

B.E. Mechanical (Part – I) Examination, 2017
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Tuesday, 9-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Answer* ***any two full*** *questions from* ***each*** *Section.*
4) *Figures to the* ***right*** *indicate* ***full*** *marks.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) _____ report is a document where in all the details obtained from technical analysis, financial analysis, profitability analysis etc. are put together.
   a) Feasibility b) Project c) Both d) None

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3) Technology developed within a country is called
   a) Technology licensing b) Purchase of technology
   c) Joint venture d) Indigenous technology

4) _____ skill relates to accounting and financing control, marketing, production, planning, inventory control and to manage people who work in the enterprise.
   a) Communication b) Decision-making
   c) Project development d) Management

5) Which of these is a social barrier to entrepreneurship ?
   a) Low status b) Custom of people
   c) Both d) None

6) _____ is the drive to achieve a goal.
   a) Motivation b) Need for achievement
   c) Competency d) None of these

7) Which of the following is the short term finance ?
   a) Trade credit b) Lease finance
   c) Hire purchase d) Public deposit

P.T.O.

8) Knowledge + Skill + Traits =
   a) Innovation b) Competency c) Skill d) Creativity

9) The capacity to develop new ideas, concepts and processes is known as
   a) Innovation b) Invention c) Skill d) Creativity

10) Which of the following risks is borne by the entrepreneur ?
   a) Financial risks b) Personal risks
   c) Psychological risks d) All of these

11) Which of the following is a psychological factor affecting entrepreneurial growth ?
   a) Legitimacy of entrepreneurship b) Social status
   c) Need for achievement d) None of these

12) _____ units provide inputs to other industries.
   a) Export b) Small c) Ancillary d) None of these

13) _____ is the financial and promotional assistance provided by the Govt. to the industries for boosting up industrial development in all regions particularly in backward areas.
   a) Seed capital b) Incentive c) Subsidy d) None of these

14) _____ is the place where the required facilities and factory accommodation are provided by the government to the entrepreneurs to establish their industries there.
   a) Industry b) Industrial estate c) Company d) None of these

15) _____ the process of collection, compilation and analysis of economic data for the purpose of finding out possible opportunities for investment.
   a) Project screening b) Project appraisal
   c) Project identification d) None

16) SWOT stands for strength, weakness, opportunity, and
   a) Treat b) Threat c) Talent d) Team

17) Project formulation means _____ study.
   a) Profitability b) Liquidity c) Feasibility d) Viability

18) _____ analysis is primarily concerned with the identification, quantification and evaluation of project resources.
   a) Network b) Financial c) Techno-economic d) Input

19) _____ is a contract between the owner and user of the asset to use the asset for a consideration.
   a) Venture capital b) Layered financing
   c) Deferred credit d) Lease financing

20) The main object of project appraisal is
   a) To find whether the project is technically feasible
   b) To ascertain whether the project is financially feasible
   c) To decide whether to accept or reject a project
   d) To know whether the project is eco-friendly

_____

SLR-VB – 113

Seat No.	

B.E. Mechanical (Part – I) Examination, 2017
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Tuesday, 9-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any two full** questions from each Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make suitable assumptions, if required and state them **clearly**.*

SECTION – I

2. a) Explain concept of entrepreneur and entrepreneurship. **10**
   b) What are the characteristics and qualities of entrepreneur ? **10**

3. a) Write classification and types of entrepreneurs. **10**
   b) Explain evolution of entrepreneurship. **10**

4. a) Explain role of culture in entrepreneurial development. **10**
   b) Explain the problems faced by entrepreneur in detail. **10**

5. Write notes on :
   a) Franchising **10**
   b) EDP. **10**

SECTION – II

6. a) Explain SWOT analysis in entrepreneurship. **10**
   b) Explain sequential stages of project formulation. **10**

7. a) Explain sources and methods for idea generation. **10**
   b) Explain contents of project report. **10**

8. a) Explain importance of small enterprises in India. **10**
   b) Write steps in setting up a small unit in detail. **10**

9. Write notes on :
   a) Fixed capital. **10**
   b) Organizational structure. **10**

Set Q

Set Q

SLR-VB – 113

Seat No.	

Set **R**

B.E. Mechanical (Part – I) Examination, 2017
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Tuesday, 9-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Answer* ***any two full*** *questions from* ***each*** *Section.*
4) *Figures to the* ***right*** *indicate* ***full*** *marks.*
5) *Make suitable assumptions, if required and state them* ***clearly****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) SWOT stands for strength, weakness, opportunity, and
   a) Treat b) Threat c) Talent d) Team

2) Project formulation means _____ study.
   a) Profitability b) Liquidity c) Feasibility d) Viability

3) _____ analysis is primarily concerned with the identification, quantification and evaluation of project resources.
   a) Network b) Financial c) Techno-economic d) Input

4) _____ is a contract between the owner and user of the asset to use the asset for a consideration.
   a) Venture capital b) Layered financing
   c) Deferred credit d) Lease financing

5) The main object of project appraisal is
   a) To find whether the project is technically feasible
   b) To ascertain whether the project is financially feasible
   c) To decide whether to accept or reject a project
   d) To know whether the project is eco-friendly

6) _____ report is a document where in all the details obtained from technical analysis, financial analysis, profitability analysis etc. are put together.
   a) Feasibility b) Project c) Both d) None

7) _____ analysis is concerned with the development of detailed work plan of the project and its time profile.
   a) Techno-economic b) Network c) Financial d) Social cost-benefit

P.T.O.

8) Technology developed within a country is called
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9) _____ skill relates to accounting and financing control, marketing, production, planning, inventory control and to manage people who work in the enterprise.
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   c) Project development d) Management

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   a) Motivation b) Need for achievement
   c) Competency d) None of these

12) Which of the following is the short term finance ?
   a) Trade credit b) Lease finance c) Hire purchase d) Public deposit

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15) Which of the following risks is borne by the entrepreneur ?
   a) Financial risks b) Personal risks
   c) Psychological risks d) All of these

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   a) Legitimacy of entrepreneurship b) Social status
   c) Need for achievement d) None of these

17) _____ units provide inputs to other industries.
   a) Export b) Small c) Ancillary d) None of these

18) _____ is the financial and promotional assistance provided by the Govt. to the industries for boosting up industrial development in all regions particularly in backward areas.
   a) Seed capital b) Incentive c) Subsidy d) None of these

19) _____ is the place where the required facilities and factory accommodation are provided by the government to the entrepreneurs to establish their industries there.
   a) Industry b) Industrial estate c) Company d) None of these

20) _____ the process of collection, compilation and analysis of economic data for the purpose of finding out possible opportunities for investment.
   a) Project screening b) Project appraisal
   c) Project identification d) None

SLR-VB – 113

Seat No.	

B.E. Mechanical (Part – I) Examination, 2017
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Tuesday, 9-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any two full** questions from each Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make suitable assumptions, if required and state them **clearly**.*

SECTION – I

2. a) Explain concept of entrepreneur and entrepreneurship. **10**
   b) What are the characteristics and qualities of entrepreneur ? **10**

3. a) Write classification and types of entrepreneurs. **10**
   b) Explain evolution of entrepreneurship. **10**

4. a) Explain role of culture in entrepreneurial development. **10**
   b) Explain the problems faced by entrepreneur in detail. **10**

5. Write notes on :
   a) Franchising **10**
   b) EDP. **10**

SECTION – II

6. a) Explain SWOT analysis in entrepreneurship. **10**
   b) Explain sequential stages of project formulation. **10**

7. a) Explain sources and methods for idea generation. **10**
   b) Explain contents of project report. **10**

8. a) Explain importance of small enterprises in India. **10**
   b) Write steps in setting up a small unit in detail. **10**

9. Write notes on :
   a) Fixed capital. **10**
   b) Organizational structure. **10**

Set R

Set R

SLR-VB – 113

Seat No.	

Set **S**

B.E. Mechanical (Part – I) Examination, 2017
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Tuesday, 9-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Answer* ***any two full*** *questions from* ***each*** *Section.*
4) *Figures to the* ***right*** *indicate* ***full*** *marks.*
5) *Make suitable assumptions, if required and state them* ***clearly****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(1×20=20)**

1) Which of the following is a psychological factor affecting entrepreneurial growth ?
   a) Legitimacy of entrepreneurship b) Social status
   c) Need for achievement d) None of these

2) _____ units provide inputs to other industries.
   a) Export b) Small c) Ancillary d) None of these

3) _____ is the financial and promotional assistance provided by the Govt. to the industries for boosting up industrial development in all regions particularly in backward areas.
   a) Seed capital b) Incentive c) Subsidy d) None of these

4) _____ is the place where the required facilities and factory accommodation are provided by the government to the entrepreneurs to establish their industries there.
   a) Industry b) Industrial estate c) Company d) None of these

5) _____ the process of collection, compilation and analysis of economic data for the purpose of finding out possible opportunities for investment.
   a) Project screening b) Project appraisal
   c) Project identification d) None

6) SWOT stands for strength, weakness, opportunity, and
   a) Treat b) Threat c) Talent d) Team

7) Project formulation means _____ study.
   a) Profitability b) Liquidity c) Feasibility d) Viability

8) _____ analysis is primarily concerned with the identification, quantification and evaluation of project resources.
   a) Network b) Financial c) Techno-economic d) Input

P.T.O.

9) _____ is a contract between the owner and user of the asset to use the asset for a consideration.
   a) Venture capital b) Layered financing
   c) Deferred credit d) Lease financing

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   b) To ascertain whether the project is financially feasible
   c) To decide whether to accept or reject a project
   d) To know whether the project is eco-friendly

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   a) Communication b) Decision-making
   c) Project development d) Management

15) Which of these is a social barrier to entrepreneurship ?
   a) Low status b) Custom of people
   c) Both d) None

16) _____ is the drive to achieve a goal.
   a) Motivation b) Need for achievement
   c) Competency d) None of these

17) Which of the following is the short term finance ?
   a) Trade credit b) Lease finance c) Hire purchase d) Public deposit

18) Knowledge + Skill + Traits =
   a) Innovation b) Competency c) Skill d) Creativity

19) The capacity to develop new ideas, concepts and processes is known as
   a) Innovation b) Invention c) Skill d) Creativity

20) Which of the following risks is borne by the entrepreneur ?
   a) Financial risks b) Personal risks
   c) Psychological risks d) All of these

_____

SLR-VB – 113

Seat No.	

B.E. Mechanical (Part – I) Examination, 2017
ENTREPRENEURSHIP DEVELOPMENT (Elective – I)

Day and Date : Tuesday, 9-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Answer **any two full** questions from each Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make suitable assumptions, if required and state them **clearly**.*

SECTION – I

2. a) Explain concept of entrepreneur and entrepreneurship. **10**
   b) What are the characteristics and qualities of entrepreneur ? **10**

3. a) Write classification and types of entrepreneurs. **10**
   b) Explain evolution of entrepreneurship. **10**

4. a) Explain role of culture in entrepreneurial development. **10**
   b) Explain the problems faced by entrepreneur in detail. **10**

5. Write notes on :
   a) Franchising **10**
   b) EDP. **10**

SECTION – II

6. a) Explain SWOT analysis in entrepreneurship. **10**
   b) Explain sequential stages of project formulation. **10**

7. a) Explain sources and methods for idea generation. **10**
   b) Explain contents of project report. **10**

8. a) Explain importance of small enterprises in India. **10**
   b) Write steps in setting up a small unit in detail. **10**

9. Write notes on :
   a) Fixed capital. **10**
   b) Organizational structure. **10**

Set S

Set S

SLR-VB – 114

Seat No.	

Set **P**

B.E. (Part – I) (Mechanical) (Old) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Monday, 29-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m

Instructions *:* 1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Neat diagrams must be drawn* ***whenever*** *necessary.*
4) *Make suitable assumptions if necessary and mention them* ***clearly****.*
5) *Figures to the* ***right*** *indicate* ***full*** *mark.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) The energy demand increases day by day because of
   a) Population increases b) Industrialization increases
   c) Transportation increases d) All of these

2) The average load factor of thermal power plants in India is
   a) 100% b) 80 to 95% c) 50 to 60% d) 20 to 30%

3) Pumped storage hydroelectric power plant is more suitable use as
   a) Peak load plant b) Base load plant
   c) Intermediate load plant d) All of the above

4) Load factor of power station is generally
   a) Equal to unity b) Less than unity
   c) More than unity d) None of the above

5) The standard frequency for electric power supply in India is
   a) 60 Hz b) 50 Hz c) 440 Hz d) 220 Hz

6) Demand factor is defined as
   a) Average load / maximum demand
   b) Maximum demand / connected load
   c) Connected load / maximum demand
   d) Maximum demand × connected load

7) The functions performed by the switch gear are
   a) Faulty plant is automatically disconnected
   b) To break short circuit
   c) To facilitate redistribution of load
   d) All of these

8) The main purpose of installed generator is to drive the
   a) Alternator b) Rotor c) Exciter d) None of these

9) For a power plant, the cost of labor is considered as ———————— cost.
   a) fixed b) variable c) progressive d) major

10) In Hopkinson demand rate or two part tariff the demand rate or fixed charges are
   a) Depends upon the energy consumed
   b) Depends upon the maximum demand
   c) Both (a) and (b)
   d) None of the above

11) The function of solar collector is to convert
   a) Solar energy in to electricity b) Solar energy in to radiation
   c) Solar energy in to thermal energy d) All of these

12) Pyreheliometer is used to measure
   a) Beam radiation b) Diffuse radiation
   c) Global radiation d) All of the above

13) _____ type of wind mill is of simple design.
   a) Horizontal axis wind mill b) Vertical axis wind mill
   c) None d) Both

14) Maximum wind energy available is proportional to
   a) square of the diameter of rotor b) air density
   c) cube of the wind velocity d) all of above

15) Tides are caused because of
   a) Sun b) Mars c) Moon d) Ocean Depth

16) A geothermal field may yield
   a) Hot Water b) Wet Steam
   c) Dry Steam d) All of the above

17) The turbine which is used in a tidal power plant for getting continuous power is
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) All of the above

18) Conservation of energy means using _____ energy for the same level of activity.
   a) More b) Less c) Partial d) Zero

19) Approximately _____ of all energy is accounted for during the detailed energy audit.
   a) 95% b) 85% c) 75% d) 65%

20) Objective of energy audit is
   a) Identify the quality
   b) Identify the cost of various energy inputs
   c) Either a) nor b)
   d) Both a) and b)

Set P

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SLR-VB – 114

Seat No.	

B.E. (Part – I) (Mechanical) (Old) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Monday, 29-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m

Instructions *: 1) Neat diagrams must be drawn* ***whenever*** *necessary.*
2) Make suitable assumptions if necessary and mention them ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *mark.*
4) Answer ***any two*** *questions from* ***each*** *Section.*

SECTION – I

2. a) Discuss different organization of power sector in India. **7**

   b) What are the effect of variable load on power plant design and operation ? **7**

   c) The peak load on power station is 35 MW. The load having maximum demands of 20 MW, 10 MW and 7 MW are connected to the power station. The capacity of power station is 40 MW and annual load factor is 55%. Find :
      i) Average load on the power station
      ii) Demand factor
      iii) Diversity factor **6**

3. a) State the principle of generator. And explain in detail. **7**

   b) Explain different methods of tariff. **6**

   c) Write a note on effect of variable load on power plant design and operation. **7**

4. Write a short note on **any four** : **(5×4=20)**
   a) Compressed air storage plant
   b) Power transformer
   c) Fixed and operating cost
   d) Base load and peak load of power station
   e) Power factor.

SECTION – II

5. a) Define altitude angle, surface azimuth angle and declination angle with neat sketch. **6**

   b) With neat sketch explain pyreheliometer. **7**

   c) Discuss the basic component of wind energy conversion system with neat block diagram. **7**

6. a) Discuss in detail wave energy. **6**

   b) Give classification of wind energy and state its advantage and disadvantages. **7**

   c) Define in detail energy Audit. **7**

7. a) Discuss different instrument for energy audit. **7**

   b) Write short note on OTEC. **7**

   c) Discuss Energy conservation in sugar industry. **6**

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Seat No.	

Set **Q**

B.E. (Part – I) (Mechanical) (Old) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Monday, 29-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m

Instructions *:* 1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) *Neat diagrams must be drawn* ***whenever*** *necessary.*
4) *Make suitable assumptions if necessary and mention them* ***clearly****.*
5) *Figures to the* ***right*** *indicate* ***full*** *mark.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) A geothermal field may yield
   a) Hot Water b) Wet Steam
   c) Dry Steam d) All of the above

2) The turbine which is used in a tidal power plant for getting continuous power is
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) All of the above

3) Conservation of energy means using _____ energy for the same level of activity.
   a) More b) Less c) Partial d) Zero

4) Approximately _____ of all energy is accounted for during the detailed energy audit.
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   b) Identify the cost of various energy inputs
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   c) Transportation increases d) All of these

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   c) Connected load / maximum demand
   d) Maximum demand × connected load

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   a) Depends upon the energy consumed
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18) _____ type of wind mill is of simple design.
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   c) None d) Both

19) Maximum wind energy available is proportional to
   a) square of the diameter of rotor b) air density
   c) cube of the wind velocity d) all of above

20) Tides are caused because of
   a) Sun b) Mars c) Moon d) Ocean Depth

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SLR-VB – 114

Seat No.	

B.E. (Part – I) (Mechanical) (Old) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Monday, 29-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m

Instructions *: 1) Neat diagrams must be drawn* ***whenever*** *necessary.*
2) Make suitable assumptions if necessary and mention them ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *mark.*
4) Answer ***any two*** *questions from* ***each*** *Section.*

SECTION – I

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   b) What are the effect of variable load on power plant design and operation ? **7**

   c) The peak load on power station is 35 MW. The load having maximum demands of 20 MW, 10 MW and 7 MW are connected to the power station. The capacity of power station is 40 MW and annual load factor is 55%. Find :
      i) Average load on the power station
      ii) Demand factor
      iii) Diversity factor **6**

3. a) State the principle of generator. And explain in detail. **7**

   b) Explain different methods of tariff. **6**

   c) Write a note on effect of variable load on power plant design and operation. **7**

4. Write a short note on **any four** : **(5×4=20)**
   a) Compressed air storage plant
   b) Power transformer
   c) Fixed and operating cost
   d) Base load and peak load of power station
   e) Power factor.

Set Q

SECTION – II

5. a) Define altitude angle, surface azimuth angle and declination angle with neat sketch. **6**

   b) With neat sketch explain pyreheliometer. **7**

   c) Discuss the basic component of wind energy conversion system with neat block diagram. **7**

6. a) Discuss in detail wave energy. **6**

   b) Give classification of wind energy and state its advantage and disadvantages. **7**

   c) Define in detail energy Audit. **7**

7. a) Discuss different instrument for energy audit. **7**

   b) Write short note on OTEC. **7**

   c) Discuss Energy conservation in sugar industry. **6**

SLR-VB – 114

Seat No.	

Set **R**

B.E. (Part – I) (Mechanical) (Old) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Monday, 29-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Neat diagrams must be drawn ***whenever*** *necessary.*
4) Make suitable assumptions if necessary and mention them ***clearly****.*
5) Figures to the ***right*** *indicate* ***full*** *mark.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) The function of solar collector is to convert
   a) Solar energy in to electricity b) Solar energy in to radiation
   c) Solar energy in to thermal energy d) All of these

2) Pyreheliometer is used to measure
   a) Beam radiation b) Diffuse radiation
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3) _____ type of wind mill is of simple design.
   a) Horizontal axis wind mill b) Vertical axis wind mill
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4) Maximum wind energy available is proportional to
   a) square of the diameter of rotor b) air density
   c) cube of the wind velocity d) all of above

5) Tides are caused because of
   a) Sun b) Mars c) Moon d) Ocean Depth

6) A geothermal field may yield
   a) Hot Water b) Wet Steam
   c) Dry Steam d) All of the above

7) The turbine which is used in a tidal power plant for getting continuous power is
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) All of the above

8) Conservation of energy means using _____ energy for the same level of activity.
   a) More b) Less c) Partial d) Zero

9) Approximately _____ of all energy is accounted for during the detailed energy audit.
   a) 95% b) 85% c) 75% d) 65%

10) Objective of energy audit is
   a) Identify the quality
   b) Identify the cost of various energy inputs
   c) Either a) nor b)
   d) Both a) and b)

11) The energy demand increases day by day because of
   a) Population increases b) Industrialization increases
   c) Transportation increases d) All of these

12) The average load factor of thermal power plants in India is
   a) 100% b) 80 to 95% c) 50 to 60% d) 20 to 30%

13) Pumped storage hydroelectric power plant is more suitable use as
   a) Peak load plant b) Base load plant
   c) Intermediate load plant d) All of the above

14) Load factor of power station is generally
   a) Equal to unity b) Less than unity
   c) More than unity d) None of the above

15) The standard frequency for electric power supply in India is
   a) 60 Hz b) 50 Hz c) 440 Hz d) 220 Hz

16) Demand factor is defined as
   a) Average load / maximum demand
   b) Maximum demand / connected load
   c) Connected load / maximum demand
   d) Maximum demand × connected load

17) The functions performed by the switch gear are
   a) Faulty plant is automatically disconnected
   b) To break short circuit
   c) To facilitate redistribution of load
   d) All of these

18) The main purpose of installed generator is to drive the
   a) Alternator b) Rotor c) Exciter d) None of these

19) For a power plant, the cost of labor is considered as ———————— cost.
   a) fixed b) variable c) progressive d) major

20) In Hopkinson demand rate or two part tariff the demand rate or fixed charges are
   a) Depends upon the energy consumed
   b) Depends upon the maximum demand
   c) Both (a) and (b)
   d) None of the above

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SLR-VB – 114

Seat No.	

B.E. (Part – I) (Mechanical) (Old) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Monday, 29-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m

Instructions *: 1) Neat diagrams must be drawn* ***whenever*** *necessary.*
2) Make suitable assumptions if necessary and mention them ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *mark.*
4) Answer ***any two*** *questions from* ***each*** *Section.*

SECTION – I

2. a) Discuss different organization of power sector in India. **7**

   b) What are the effect of variable load on power plant design and operation ? **7**

   c) The peak load on power station is 35 MW. The load having maximum demands of 20 MW, 10 MW and 7 MW are connected to the power station. The capacity of power station is 40 MW and annual load factor is 55%. Find :
      i) Average load on the power station
      ii) Demand factor
      iii) Diversity factor **6**

3. a) State the principle of generator. And explain in detail. **7**

   b) Explain different methods of tariff. **6**

   c) Write a note on effect of variable load on power plant design and operation. **7**

4. Write a short note on **any four** : **(5×4=20)**
   a) Compressed air storage plant
   b) Power transformer
   c) Fixed and operating cost
   d) Base load and peak load of power station
   e) Power factor.

Set R

SECTION – II

5. a) Define altitude angle, surface azimuth angle and declination angle with neat sketch. **6**

   b) With neat sketch explain pyreheliometer. **7**

   c) Discuss the basic component of wind energy conversion system with neat block diagram. **7**

6. a) Discuss in detail wave energy. **6**

   b) Give classification of wind energy and state its advantage and disadvantages. **7**

   c) Define in detail energy Audit. **7**

7. a) Discuss different instrument for energy audit. **7**

   b) Write short note on OTEC. **7**

   c) Discuss Energy conservation in sugar industry. **6**

SLR-VB – 114

Seat No.	

Set **S**

B.E. (Part – I) (Mechanical) (Old) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Monday, 29-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) Neat diagrams must be drawn ***whenever*** *necessary.*
4) Make suitable assumptions if necessary and mention them ***clearly****.*
5) Figures to the ***right*** *indicate* ***full*** *mark.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) Demand factor is defined as
   a) Average load / maximum demand
   b) Maximum demand / connected load
   c) Connected load / maximum demand
   d) Maximum demand × connected load

2) The functions performed by the switch gear are
   a) Faulty plant is automatically disconnected
   b) To break short circuit
   c) To facilitate redistribution of load
   d) All of these

3) The main purpose of installed generator is to drive the
   a) Alternator b) Rotor c) Exciter d) None of these

4) For a power plant, the cost of labor is considered as ———————— cost.
   a) fixed b) variable c) progressive d) major

5) In Hopkinson demand rate or two part tariff the demand rate or fixed charges are
   a) Depends upon the energy consumed
   b) Depends upon the maximum demand
   c) Both (a) and (b)
   d) None of the above

6) The function of solar collector is to convert
   a) Solar energy in to electricity b) Solar energy in to radiation
   c) Solar energy in to thermal energy d) All of these

7) Pyreheliometer is used to measure
   a) Beam radiation b) Diffuse radiation
   c) Global radiation d) All of the above

8) _____ type of wind mill is of simple design.
   a) Horizontal axis wind mill b) Vertical axis wind mill
   c) None d) Both

9) Maximum wind energy available is proportional to
   a) square of the diameter of rotor b) air density
   c) cube of the wind velocity d) all of above

10) Tides are caused because of
   a) Sun b) Mars c) Moon d) Ocean Depth

11) A geothermal field may yield
   a) Hot Water b) Wet Steam
   c) Dry Steam d) All of the above

12) The turbine which is used in a tidal power plant for getting continuous power is
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) All of the above

13) Conservation of energy means using _____ energy for the same level of activity.
   a) More b) Less c) Partial d) Zero

14) Approximately _____ of all energy is accounted for during the detailed energy audit.
   a) 95% b) 85% c) 75% d) 65%

15) Objective of energy audit is
   a) Identify the quality
   b) Identify the cost of various energy inputs
   c) Either a) nor b)
   d) Both a) and b)

16) The energy demand increases day by day because of
   a) Population increases b) Industrialization increases
   c) Transportation increases d) All of these

17) The average load factor of thermal power plants in India is
   a) 100% b) 80 to 95% c) 50 to 60% d) 20 to 30%

18) Pumped storage hydroelectric power plant is more suitable use as
   a) Peak load plant b) Base load plant
   c) Intermediate load plant d) All of the above

19) Load factor of power station is generally
   a) Equal to unity b) Less than unity
   c) More than unity d) None of the above

20) The standard frequency for electric power supply in India is
   a) 60 Hz b) 50 Hz c) 440 Hz d) 220 Hz

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SLR-VB – 114

Seat No.	

B.E. (Part – I) (Mechanical) (Old) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Monday, 29-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m

Instructions *: 1) Neat diagrams must be drawn* ***whenever*** *necessary.*
2) Make suitable assumptions if necessary and mention them ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *mark.*
4) Answer ***any two*** *questions from* ***each*** *Section.*

SECTION – I

2. a) Discuss different organization of power sector in India. **7**

   b) What are the effect of variable load on power plant design and operation ? **7**

   c) The peak load on power station is 35 MW. The load having maximum demands of 20 MW, 10 MW and 7 MW are connected to the power station. The capacity of power station is 40 MW and annual load factor is 55%. Find :
      i) Average load on the power station
      ii) Demand factor
      iii) Diversity factor **6**

3. a) State the principle of generator. And explain in detail. **7**

   b) Explain different methods of tariff. **6**

   c) Write a note on effect of variable load on power plant design and operation. **7**

4. Write a short note on **any four** : **(5×4=20)**
   a) Compressed air storage plant
   b) Power transformer
   c) Fixed and operating cost
   d) Base load and peak load of power station
   e) Power factor.

Set S

SECTION – II

5. a) Define altitude angle, surface azimuth angle and declination angle with neat sketch. **6**

   b) With neat sketch explain pyreheliometer. **7**

   c) Discuss the basic component of wind energy conversion system with neat block diagram. **7**

6. a) Discuss in detail wave energy. **6**

   b) Give classification of wind energy and state its advantage and disadvantages. **7**

   c) Define in detail energy Audit. **7**

7. a) Discuss different instrument for energy audit. **7**

   b) Write short note on OTEC. **7**

   c) Discuss Energy conservation in sugar industry. **6**

SLR-VB – 115

Seat No.	

Set **P**

B.E. (Mechanical) (Part – I) (Old) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Monday, 29-5-2017 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Answer **any two** questions from **each** Section.*
*4) **Assume** suitable data **if necessary**.*
*5) Use of non-programmable calculator is **allowed**.*
*6) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Compression ratio in a CI engine is
a) 5-6 b) 6-10 c) 12-14 d) 16-24

2) The nominal volume generated by the working piston when travelling from one dead centre to other is called
a) Clearance volume b) Swept volume
c) Stroke d) Engine capacity

3) In carburetor lean mixture is required during
a) Idling b) Starting c) Accelerating d) Cruising

4) Valve overlap occurs between
a) Intake and compression strokes b) Compression and power strokes
c) Power and exhaust strokes d) Exhaust and intake strokes

5) An altitude mixture correction device in carburetor is used for
a) Reduce the quantity of fuel progressively
b) Increase the quantity of fuel progressively
c) Increase the quantity of air progressively
d) None of the above

6) For a four cylinder vertical engine, the commonly used firing order is
a) 1-2-3-4 b) 3-4-1-2 c) 1-3-4-2 d) 4-3-2-1

7) Fuel injector is used in
a) Gas engines b) CI engines c) SI engines d) None of the above

8) In turbochargers compressor is driven by
   a) Exhaust gas turbine b) Engine
   c) Electric motor d) None of the above

9) Very high powered engines used for ship propulsion are generally
   a) Two stroke petrol engines b) Four stroke petrol engines
   c) Four stroke diesel engines d) Two stroke diesel engines

10) The air standard Otto cycle consists of
   a) Two constant pressure and two isentropic processes
   b) Two constant volume and two isentropic processes
   c) Two constant pressure and two constant volume processes
   d) None of the above

11) Detonation in SI engines occur due to
   a) Pre-ignition of the charge before the spark
   b) Sudden ignition of the charge before the spark
   c) Auto ignition of the charge after the spark is struck
   d) None of the above

12) The combustion in spark ignition engine is
   a) Homogeneous b) Heterogeneous c) Laminar d) None of the above

13) Knocking takes place in CI engines
   a) At the start of combustion b) At the end of combustion
   c) During combustion d) None of the above

14) Morse test is applicable to
   a) Single cylinder SI engines b) Single cylinder CI engines
   c) Multi-cylinder SI engines d) None of the above

15) Brake thermal efficiency of SI engine is in the range
   a) 35% to 60% b) 25% to 35% c) 60% to 80% d) None of the above

16) Gasohol is a mixture of
   a) 90% ethanol + 10% gasoline b) 10% ethanol + 90% gasoline
   c) 40% ethanol + 60% gasoline d) 50% ethanol + 50% gasoline

17) Advantage of hydrogen as SI Engine fuel is
   a) High volumetric efficiency b) Low fuel cost
   c) No HC and CO emissions d) Safe fuel

18) EGR has a disadvantage of
   a) Decrease in thermal efficiency b) Increasing HC emission
   c) Both a) and b) d) Increasing aldehydes

19) Blue smoke in diesel engine indicates
   a) NOx b) HC c) CO d) Unburnt oil

20) Octane number of natural gas is
   a) 60-80 b) 80-100 c) Greater than 100 d) Less than 60

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SLR-VB – 115

Seat No.	

B.E. (Mechanical) (Part – I) (Old) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Monday, 29-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) **Assume** suitable data **if necessary**.*
*3) Use of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Explain why actual cycle efficiency is much lower than air standard cycle. Discuss any three losses in actual cycle. **6**

   b) Derive an equation for air-fuel ratio for carburetor by approximate method. **6**

   c) Compare S.I. and C.I. engines with respect to basic cycles, compression ratio, speed, fuel used, thermal efficiency, weight to power ratio, ignition system used and load control. **8**

3. a) A simple jet carburetor is required to supply 6 kg of air and 0.45 kg of fuel per minute. The fuel specific gravity is 0.74. The air is initially at 1.013 bar and 27°C. Calculate the throat diameter of the choke for a flow velocity of 92 m/s. Velocity coefficient is 0.8. If the pressure drops across the fuel metering orifice is 0.75 of that of the choke. Calculate the orifice diameter assuming $C_{df} = 0.6$, $\gamma = 1.4$ and $C_p = 1005$ J/kgK. **6**

   b) Explain important for factors considered for engine selection for **6**

      I) Marine application

      II) Aircraft application.

   c) List the compensating devices used in carburetor and explain any one with sketch. **8**

4. a) Determine the diameter of the fuel orifice for 4 stroke engine developing 15 kW/cylinder at 2000 rpm using 0.272 kg/kW. hr fuel for 32°API. The duration of injection is 30° crank angle. Fuel injection pressure is 120 bar and combustion chamber pressure is 30 bar. Take velocity coefficient 0.9 and specific gravity is given by, $\text{Specific Gravity} = \frac{141.5}{131.5 + {}^{\circ}\text{API}}$. **8**

   b) Explain the effect of supercharging with PV diagram on performance of an engine. **6**

   c) Classify lubrication system of IC Engine. Explain pressure lubrication system with figure. **6**

SECTION – II

5. a) Compare between petrol knock and diesel knock. **6**

   b) Explain HUCR. What are the basic requirements of good S.I. engine combustion chamber ? **6**

   c) Write short notes on : **8**

      1) Catalytic converter

      2) Physical delay and chemical delay period.

6. a) Explain various stages of combustion in CI engine in detail with a neat p-θ diagram. **8**

   b) Find the brake specific fuel consumption in kg/kW.hr of a diesel engine whose fuel consumption in 5 gms/sec. when the power output is 80 kW. If the mechanical efficiency is 75%, also calculate the indicated specific fuel consumption. **4**

   c) Write short notes on : **8**

      1) Detonation in S.I. Engine

      2) Additives used for petrol fuel

7. a) Describe the method of finding friction power using Morse test. **6**

   b) Give comparison between LPG and petrol as fuel for SI engines. **6**

   c) Write short notes on : **8**

      1) Willan's line method

      2) EGR.

SLR-VB – 115

Seat No.	

Set **Q**

B.E. (Mechanical) (Part – I) (Old) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Monday, 29-5-2017 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Answer **any two** questions from **each** Section.*
*4) **Assume** suitable data **if necessary**.*
*5) Use of non-programmable calculator is **allowed**.*
*6) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Gasohol is a mixture of
   a) 90% ethanol + 10% gasoline b) 10% ethanol + 90% gasoline
   c) 40% ethanol + 60% gasoline d) 50% ethanol + 50% gasoline

2) Advantage of hydrogen as SI Engine fuel is
   a) High volumetric efficiency b) Low fuel cost
   c) No HC and CO emissions d) Safe fuel

3) EGR has a disadvantage of
   a) Decrease in thermal efficiency b) Increasing HC emission
   c) Both a) and b) d) Increasing aldehydes

4) Blue smoke in diesel engine indicates
   a) NOx b) HC c) CO d) Unburnt oil

5) Octane number of natural gas is
   a) 60-80 b) 80-100 c) Greater than 100 d) Less than 60

6) Compression ratio in a CI engine is
   a) 5-6 b) 6-10 c) 12-14 d) 16-24

7) The nominal volume generated by the working piston when travelling from one dead centre to other is called
   a) Clearance volume b) Swept volume
   c) Stroke d) Engine capacity

8) In carburetor lean mixture is required during
   a) Idling b) Starting c) Accelerating d) Cruising

9) Valve overlap occurs between
   a) Intake and compression strokes b) Compression and power strokes
   c) Power and exhaust strokes d) Exhaust and intake strokes

10) An altitude mixture correction device in carburetor is used for
   a) Reduce the quantity of fuel progressively
   b) Increase the quantity of fuel progressively
   c) Increase the quantity of air progressively
   d) None of the above

11) For a four cylinder vertical engine, the commonly used firing order is
   a) 1-2-3-4 b) 3-4-1-2 c) 1-3-4-2 d) 4-3-2-1

12) Fuel injector is used in
   a) Gas engines b) CI engines c) SI engines d) None of the above

13) In turbochargers compressor is driven by
   a) Exhaust gas turbine b) Engine
   c) Electric motor d) None of the above

14) Very high powered engines used for ship propulsion are generally
   a) Two stroke petrol engines b) Four stroke petrol engines
   c) Four stroke diesel engines d) Two stroke diesel engines

15) The air standard Otto cycle consists of
   a) Two constant pressure and two isentropic processes
   b) Two constant volume and two isentropic processes
   c) Two constant pressure and two constant volume processes
   d) None of the above

16) Detonation in SI engines occur due to
   a) Pre-ignition of the charge before the spark
   b) Sudden ignition of the charge before the spark
   c) Auto ignition of the charge after the spark is struck
   d) None of the above

17) The combustion in spark ignition engine is
   a) Homogeneous b) Heterogeneous c) Laminar d) None of the above

18) Knocking takes place in CI engines
   a) At the start of combustion b) At the end of combustion
   c) During combustion d) None of the above

19) Morse test is applicable to
   a) Single cylinder SI engines b) Single cylinder CI engines
   c) Multi-cylinder SI engines d) None of the above

20) Brake thermal efficiency of SI engine is in the range
   a) 35% to 60% b) 25% to 35% c) 60% to 80% d) None of the above

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SLR-VB – 115

Seat No.	

B.E. (Mechanical) (Part – I) (Old) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Monday, 29-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) **Assume** suitable data **if necessary**.*
*3) Use of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Explain why actual cycle efficiency is much lower than air standard cycle. Discuss any three losses in actual cycle. **6**

   b) Derive an equation for air-fuel ratio for carburetor by approximate method. **6**

   c) Compare S.I. and C.I. engines with respect to basic cycles, compression ratio, speed, fuel used, thermal efficiency, weight to power ratio, ignition system used and load control. **8**

3. a) A simple jet carburetor is required to supply 6 kg of air and 0.45 kg of fuel per minute. The fuel specific gravity is 0.74. The air is initially at 1.013 bar and 27°C. Calculate the throat diameter of the choke for a flow velocity of 92 m/s. Velocity coefficient is 0.8. If the pressure drops across the fuel metering orifice is 0.75 of that of the choke. Calculate the orifice diameter assuming $C_{df} = 0.6$, $\gamma = 1.4$ and $C_p = 1005$ J/kgK. **6**

   b) Explain important for factors considered for engine selection for **6**

      I) Marine application

      II) Aircraft application.

   c) List the compensating devices used in carburetor and explain any one with sketch. **8**

4. a) Determine the diameter of the fuel orifice for 4 stroke engine developing 15 kW/cylinder at 2000 rpm using 0.272 kg/kW. hr fuel for 32°API. The duration of injection is 30° crank angle. Fuel injection pressure is 120 bar and combustion chamber pressure is 30 bar. Take velocity coefficient 0.9 and specific gravity is given by, $\text{Specific Gravity} = \frac{141.5}{131.5 + {}^{\circ}\text{API}}$. **8**

   b) Explain the effect of supercharging with PV diagram on performance of an engine. **6**

   c) Classify lubrication system of IC Engine. Explain pressure lubrication system with figure. **6**

SECTION – II

5. a) Compare between petrol knock and diesel knock. **6**

   b) Explain HUCR. What are the basic requirements of good S.I. engine combustion chamber ? **6**

   c) Write short notes on : **8**

      1) Catalytic converter

      2) Physical delay and chemical delay period.

6. a) Explain various stages of combustion in CI engine in detail with a neat p-θ diagram. **8**

   b) Find the brake specific fuel consumption in kg/kW.hr of a diesel engine whose fuel consumption in 5 gms/sec. when the power output is 80 kW. If the mechanical efficiency is 75%, also calculate the indicated specific fuel consumption. **4**

   c) Write short notes on : **8**

      1) Detonation in S.I. Engine

      2) Additives used for petrol fuel

7. a) Describe the method of finding friction power using Morse test. **6**

   b) Give comparison between LPG and petrol as fuel for SI engines. **6**

   c) Write short notes on : **8**

      1) Willan's line method

      2) EGR.

SLR-VB – 115

Seat No.	

Set **R**

B.E. (Mechanical) (Part – I) (Old) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Monday, 29-5-2017 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Answer **any two** questions from **each** Section.*
*4) **Assume** suitable data **if necessary**.*
*5) Use of non-programmable calculator is **allowed**.*
*6) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Detonation in SI engines occur due to
   a) Pre-ignition of the charge before the spark
   b) Sudden ignition of the charge before the spark
   c) Auto ignition of the charge after the spark is struck
   d) None of the above

2) The combustion in spark ignition engine is
   a) Homogeneous b) Heterogeneous c) Laminar d) None of the above

3) Knocking takes place in CI engines
   a) At the start of combustion b) At the end of combustion
   c) During combustion d) None of the above

4) Morse test is applicable to
   a) Single cylinder SI engines b) Single cylinder CI engines
   c) Multi-cylinder SI engines d) None of the above

5) Brake thermal efficiency of SI engine is in the range
   a) 35% to 60% b) 25% to 35% c) 60% to 80% d) None of the above

6) Gasohol is a mixture of
   a) 90% ethanol + 10% gasoline b) 10% ethanol + 90% gasoline
   c) 40% ethanol + 60% gasoline d) 50% ethanol + 50% gasoline

7) Advantage of hydrogen as SI Engine fuel is
   a) High volumetric efficiency b) Low fuel cost
   c) No HC and CO emissions d) Safe fuel

8) EGR has a disadvantage of
   a) Decrease in thermal efficiency b) Increasing HC emission
   c) Both a) and b) d) Increasing aldehydes

9) Blue smoke in diesel engine indicates
   a) NOx b) HC c) CO d) Unburnt oil

10) Octane number of natural gas is
   a) 60-80 b) 80-100 c) Greater than 100 d) Less than 60

11) Compression ratio in a CI engine is
   a) 5-6 b) 6-10 c) 12-14 d) 16-24

12) The nominal volume generated by the working piston when travelling from one dead centre to other is called
   a) Clearance volume b) Swept volume
   c) Stroke d) Engine capacity

13) In carburetor lean mixture is required during
   a) Idling b) Starting c) Accelerating d) Cruising

14) Valve overlap occurs between
   a) Intake and compression strokes b) Compression and power strokes
   c) Power and exhaust strokes d) Exhaust and intake strokes

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   a) Reduce the quantity of fuel progressively
   b) Increase the quantity of fuel progressively
   c) Increase the quantity of air progressively
   d) None of the above

16) For a four cylinder vertical engine, the commonly used firing order is
   a) 1-2-3-4 b) 3-4-1-2 c) 1-3-4-2 d) 4-3-2-1

17) Fuel injector is used in
   a) Gas engines b) CI engines c) SI engines d) None of the above

18) In turbochargers compressor is driven by
   a) Exhaust gas turbine b) Engine
   c) Electric motor d) None of the above

19) Very high powered engines used for ship propulsion are generally
   a) Two stroke petrol engines b) Four stroke petrol engines
   c) Four stroke diesel engines d) Two stroke diesel engines

20) The air standard Otto cycle consists of
   a) Two constant pressure and two isentropic processes
   b) Two constant volume and two isentropic processes
   c) Two constant pressure and two constant volume processes
   d) None of the above

SLR-VB – 115

Seat No.	

B.E. (Mechanical) (Part – I) (Old) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Monday, 29-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) **Assume** suitable data **if necessary**.*
*3) Use of non-programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

2. a) Explain why actual cycle efficiency is much lower than air standard cycle. Discuss any three losses in actual cycle. **6**

   b) Derive an equation for air-fuel ratio for carburetor by approximate method. **6**

   c) Compare S.I. and C.I. engines with respect to basic cycles, compression ratio, speed, fuel used, thermal efficiency, weight to power ratio, ignition system used and load control. **8**

3. a) A simple jet carburetor is required to supply 6 kg of air and 0.45 kg of fuel per minute. The fuel specific gravity is 0.74. The air is initially at 1.013 bar and 27°C. Calculate the throat diameter of the choke for a flow velocity of 92 m/s. Velocity coefficient is 0.8. If the pressure drops across the fuel metering orifice is 0.75 of that of the choke. Calculate the orifice diameter assuming $C_{df} = 0.6$, $\gamma = 1.4$ and $C_p = 1005$ J/kgK. **6**

   b) Explain important for factors considered for engine selection for **6**

      I) Marine application

      II) Aircraft application.

   c) List the compensating devices used in carburetor and explain any one with sketch. **8**

4. a) Determine the diameter of the fuel orifice for 4 stroke engine developing 15 kW/cylinder at 2000 rpm using 0.272 kg/kW. hr fuel for 32°API. The duration of injection is 30° crank angle. Fuel injection pressure is 120 bar and combustion chamber pressure is 30 bar. Take velocity coefficient 0.9 and specific gravity is given by, $\text{Specific Gravity} = \frac{141.5}{131.5 + {}^{\circ}\text{API}}$. **8**

   b) Explain the effect of supercharging with PV diagram on performance of an engine. **6**

   c) Classify lubrication system of IC Engine. Explain pressure lubrication system with figure. **6**

SECTION – II

5. a) Compare between petrol knock and diesel knock. **6**

   b) Explain HUCR. What are the basic requirements of good S.I. engine combustion chamber ? **6**

   c) Write short notes on : **8**

      1) Catalytic converter

      2) Physical delay and chemical delay period.

6. a) Explain various stages of combustion in CI engine in detail with a neat p-θ diagram. **8**

   b) Find the brake specific fuel consumption in kg/kW.hr of a diesel engine whose fuel consumption in 5 gms/sec. when the power output is 80 kW. If the mechanical efficiency is 75%, also calculate the indicated specific fuel consumption. **4**

   c) Write short notes on : **8**

      1) Detonation in S.I. Engine

      2) Additives used for petrol fuel

7. a) Describe the method of finding friction power using Morse test. **6**

   b) Give comparison between LPG and petrol as fuel for SI engines. **6**

   c) Write short notes on : **8**

      1) Willan's line method

      2) EGR.

SLR-VB – 115

Seat No.	

Set **S**

B.E. (Mechanical) (Part – I) (Old) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Monday, 29-5-2017 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Answer **any two** questions from **each** Section.*
*4) **Assume** suitable data **if necessary**.*
*5) Use of non-programmable calculator is **allowed**.*
*6) Figures to the **right** indicate **full** marks.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) For a four cylinder vertical engine, the commonly used firing order is
a) 1-2-3-4 b) 3-4-1-2 c) 1-3-4-2 d) 4-3-2-1

2) Fuel injector is used in
a) Gas engines b) CI engines c) SI engines d) None of the above

3) In turbochargers compressor is driven by
a) Exhaust gas turbine b) Engine
c) Electric motor d) None of the above

4) Very high powered engines used for ship propulsion are generally
a) Two stroke petrol engines b) Four stroke petrol engines
c) Four stroke diesel engines d) Two stroke diesel engines

5) The air standard Otto cycle consists of
a) Two constant pressure and two isentropic processes
b) Two constant volume and two isentropic processes
c) Two constant pressure and two constant volume processes
d) None of the above

6) Detonation in SI engines occur due to
a) Pre-ignition of the charge before the spark
b) Sudden ignition of the charge before the spark
c) Auto ignition of the charge after the spark is struck
d) None of the above

7) The combustion in spark ignition engine is
   a) Homogeneous b) Heterogeneous c) Laminar d) None of the above
8) Knocking takes place in CI engines
   a) At the start of combustion b) At the end of combustion
   c) During combustion d) None of the above
9) Morse test is applicable to
   a) Single cylinder SI engines b) Single cylinder CI engines
   c) Multi-cylinder SI engines d) None of the above
10) Brake thermal efficiency of SI engine is in the range
   a) 35% to 60% b) 25% to 35% c) 60% to 80% d) None of the above
11) Gasohol is a mixture of
   a) 90% ethanol + 10% gasoline b) 10% ethanol + 90% gasoline
   c) 40% ethanol + 60% gasoline d) 50% ethanol + 50% gasoline
12) Advantage of hydrogen as SI Engine fuel is
   a) High volumetric efficiency b) Low fuel cost
   c) No HC and CO emissions d) Safe fuel
13) EGR has a disadvantage of
   a) Decrease in thermal efficiency b) Increasing HC emission
   c) Both a) and b) d) Increasing aldehydes
14) Blue smoke in diesel engine indicates
   a) NOx b) HC c) CO d) Unburnt oil
15) Octane number of natural gas is
   a) 60-80 b) 80-100 c) Greater than 100 d) Less than 60
16) Compression ratio in a CI engine is
   a) 5-6 b) 6-10 c) 12-14 d) 16-24
17) The nominal volume generated by the working piston when travelling from one dead centre to other is called
   a) Clearance volume b) Swept volume
   c) Stroke d) Engine capacity
18) In carburetor lean mixture is required during
   a) Idling b) Starting c) Accelerating d) Cruising
19) Valve overlap occurs between
   a) Intake and compression strokes b) Compression and power strokes
   c) Power and exhaust strokes d) Exhaust and intake strokes
20) An altitude mixture correction device in carburetor is used for
   a) Reduce the quantity of fuel progressively
   b) Increase the quantity of fuel progressively
   c) Increase the quantity of air progressively
   d) None of the above

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SLR-VB – 115

Seat No.	

B.E. (Mechanical) (Part – I) (Old) Examination, 2017
INTERNAL COMBUSTION ENGINE

Day and Date : Monday, 29-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) **Assume** suitable data **if necessary**.*
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SECTION – I

2. a) Explain why actual cycle efficiency is much lower than air standard cycle. Discuss any three losses in actual cycle. **6**

   b) Derive an equation for air-fuel ratio for carburetor by approximate method. **6**

   c) Compare S.I. and C.I. engines with respect to basic cycles, compression ratio, speed, fuel used, thermal efficiency, weight to power ratio, ignition system used and load control. **8**

3. a) A simple jet carburetor is required to supply 6 kg of air and 0.45 kg of fuel per minute. The fuel specific gravity is 0.74. The air is initially at 1.013 bar and 27°C. Calculate the throat diameter of the choke for a flow velocity of 92 m/s. Velocity coefficient is 0.8. If the pressure drops across the fuel metering orifice is 0.75 of that of the choke. Calculate the orifice diameter assuming $C_{df} = 0.6$, $\gamma = 1.4$ and $C_p = 1005$ J/kgK. **6**

   b) Explain important for factors considered for engine selection for **6**

      I) Marine application

      II) Aircraft application.

   c) List the compensating devices used in carburetor and explain any one with sketch. **8**

4. a) Determine the diameter of the fuel orifice for 4 stroke engine developing 15 kW/cylinder at 2000 rpm using 0.272 kg/kW. hr fuel for 32°API. The duration of injection is 30° crank angle. Fuel injection pressure is 120 bar and combustion chamber pressure is 30 bar. Take velocity coefficient 0.9 and specific gravity is given by, $\text{Specific Gravity} = \frac{141.5}{131.5 + {}^{\circ}\text{API}}$. **8**

   b) Explain the effect of supercharging with PV diagram on performance of an engine. **6**

   c) Classify lubrication system of IC Engine. Explain pressure lubrication system with figure. **6**

SECTION – II

5. a) Compare between petrol knock and diesel knock. **6**

   b) Explain HUCR. What are the basic requirements of good S.I. engine combustion chamber ? **6**

   c) Write short notes on : **8**

      1) Catalytic converter

      2) Physical delay and chemical delay period.

6. a) Explain various stages of combustion in CI engine in detail with a neat p-θ diagram. **8**

   b) Find the brake specific fuel consumption in kg/kW.hr of a diesel engine whose fuel consumption in 5 gms/sec. when the power output is 80 kW. If the mechanical efficiency is 75%, also calculate the indicated specific fuel consumption. **4**

   c) Write short notes on : **8**

      1) Detonation in S.I. Engine

      2) Additives used for petrol fuel

7. a) Describe the method of finding friction power using Morse test. **6**

   b) Give comparison between LPG and petrol as fuel for SI engines. **6**

   c) Write short notes on : **8**

      1) Willan's line method

      2) EGR.

SLR-VB – 116

Seat No.	

Set **P**

B.E. (Mechanical) (Part – II) Examination, 2017
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 16-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, if required and state them **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(20×1=20)**

1) _____ funds are required to meet the working capital needs like investment in the Inventories, debtors, bank balance, cash on hand, marketable security etc.
A) Long term B) Short term C) Middle term D) Fixed

2) _____ involves the introduction of new employees to the enterprise, its function, tasks and people.
A) Planning B) Orienting
C) Probation D) Acclimatization

3) Planning and Marketing Services, Physical Distribution, Selling are basic functions of _____
A) Marketing Manager B) Production Manager
C) General Manager D) Plant Manager

4) The amount of working capital depends _____ upon the volume of business.
A) directly B) inversely C) twice D) no relation

5) Machinery, material handling equipment, tools, jigs, fixtures comes under _____
A) Working capital B) Machinery capital
C) Fixed capital D) Variable capital

6) _____ management called country club management.
A) 9.1 B) 9.9 C) 5.5 D) 1.9

7) _____ leader uses his or her power very little, if at all, giving subordinates a high degree of independence in their operations.
A) Autocratic B) The free rein C) Democratic D) Ideal

P.T.O.

8) The producer can decrease his risk by submitting the lots of _____
   A) same as AQL B) better than AQL
   C) less than AQL D) only AQL

9) Under Theory _____ Average human being learn, under proper conditions, not only to accept responsibility but also to seek it.
   A) W B) X C) Y D) Z

10) For any given 'n' and 'c' there is maximum value of _____ beyond which the average fraction defective passed forward will not rise.
   A) AQL B) AOQL C) AOQ D) OK lot

11) Figurehead role, leader role, liaison role are _____ managerial roles.
   A) Interpersonal B) Informational C) Decision D) Leading

12) The success of sampling inspection depends upon _____
   A) Lot size B) Sample size
   C) Acceptance number D) All

13) In double sampling plan second sample is taken when the number of defective _____
   A) exceeds c1 but doesn't exceeds c2 B) doesn't exceeds c1
   C) exceeds both c1 and c2 D) exceeds c2

14) The larger the sample size and acceptance number _____ is the slope of OC curve.
   A) Straight B) Curve C) Steeper D) Horizontal

15) The producers risk is denoted by _____
   A) ρ B) β C) α D) δ

16) In any sampling plan if 'c' is the acceptance number then the rejection number is _____
   A) c B) c – 1 C) c + 2 D) c + 1

17) In a sampling plan N = 500, $n_1 = 10$, $n_2 = 8$, $c_1 = 1$, $c_2 = 4$, if the number of defectives in the 1st sample are 3, then the decision will be _____
   A) no rejection B) take a second sample and inspect
   C) go with production D) lot ok

18) Quality is defined as _____ for use.
   A) Fitness B) Standard C) Requirement D) Availability

19) Cost associated with defective products being shipped to the customers are called as _____
   A) Cost of internal failure B) Total cost of failure
   C) Rejection cost D) Cost of external failure

20) In _____ concept customer satisfaction is of prime importance.
   A) Selling B) Manufacturing C) Marketing D) Business

_____

SLR-VB – 116

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 16-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Figures to **right** indicate **full** marks.*
*2) Make suitable assumptions, if required and state them **clearly**.*
*3) Answer **any three full** question from **each** Section.*

SECTION – I

Solve **any three** questions.

2. a) Define planning and explain different advantages and limitations of planning. **6**

   b) What are types of organization ? Explain problems with organization level. **7**

3. a) Explain hierarchy of needs theory of motivation. **6**

   b) Explain the different types of communication processes. **7**

4. a) Explain the elements for performance appraisal. What are various methods of training managers ? **6**

   b) What are the different leadership styles ? **7**

5. a) Compare between marketing and selling concept. **7**

   b) What are objectives and functions of Production planning and control ? **7**

SECTION – II

Solve **any three** questions :

6. a) What is the meaning of quality of design ? Explain the factors which influence the quality of design. **6**

   b) Explain cause and effect diagram, scatter diagram and Pareto analysis. **7**

Set P

7. a) Explain the various types of sampling plans which are in practice in industry with their respective acceptance criteria. **6**

   b) Explain actual and ideal OC curve for a sampling plan. Also explain all concepts such as Producer's risk, consumer's risk, AQL, LTPD, AOQL etc. **7**

8. a) Explain what you mean by Quality Function Deployment (QFD). **7**

   b) Write short note on FMEA. **7**

9. a) Explain what you mean by benchmarking. **6**

   b) Write procedure for control chart preparation. Explain it for C chart. **7**

SLR-VB – 116

Seat No.	

Set **Q**

B.E. (Mechanical) (Part – II) Examination, 2017
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 16-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, if required and state them **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(20×1=20)**

1) In any sampling plan if 'c' is the acceptance number then the rejection number is _____
A) c B) c – 1 C) c + 2 D) c + 1

2) In a sampling plan N = 500, n_1 = 10, n_2 = 8, c_1 = 1, c_2 = 4, if the number of defectives in the 1st sample are 3, then the decision will be _____
A) no rejection B) take a second sample and inspect
C) go with production D) lot ok

3) Quality is defined as _____ for use.
A) Fitness B) Standard C) Requirement D) Availability

4) Cost associated with defective products being shipped to the customers are called as _____
A) Cost of internal failure B) Total cost of failure
C) Rejection cost D) Cost of external failure

5) In _____ concept customer satisfaction is of prime importance.
A) Selling B) Manufacturing C) Marketing D) Business

6) _____ funds are required to meet the working capital needs like investment in the Inventories, debtors, bank balance, cash on hand, marketable security etc.
A) Long term B) Short term C) Middle term D) Fixed

7) _____ involves the introduction of new employees to the enterprise, its function, tasks and people.
A) Planning B) Orienting
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P.T.O.

8) Planning and Marketing Services, Physical Distribution, Selling are basic functions of _____
   A) Marketing Manager B) Production Manager
   C) General Manager D) Plant Manager

9) The amount of working capital depends _____ upon the volume of business.
   A) directly B) inversely C) twice D) no relation

10) Machinery, material handling equipment, tools, jigs, fixtures comes under _____
   A) Working capital B) Machinery capital
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11) _____ management called country club management.
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12) _____ leader uses his or her power very little, if at all, giving subordinates a high degree of independence in their operations.
   A) Autocratic B) The free rein C) Democratic D) Ideal

13) The producer can decrease his risk by submitting the lots of _____
   A) same as AQL B) better than AQL
   C) less than AQL D) only AQL

14) Under Theory _____ Average human being learn, under proper conditions, not only to accept responsibility but also to seek it.
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15) For any given 'n' and 'c' there is maximum value of _____ beyond which the average fraction defective passed forward will not rise.
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16) Figurehead role, leader role, liaison role are _____ managerial roles.
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   A) Lot size B) Sample size
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   A) exceeds c1 but doesn't exceeds c2 B) doesn't exceeds c1
   C) exceeds both c1 and c2 D) exceeds c2

19) The larger the sample size and acceptance number _____ is the slope of OC curve.
   A) Straight B) Curve C) Steeper D) Horizontal

20) The producers risk is denoted by _____
   A) ρ B) β C) α D) δ

_____

SLR-VB – 116

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 16-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Figures to **right** indicate **full** marks.*
*2) Make suitable assumptions, if required and state them **clearly**.*
*3) Answer **any three full** question from **each** Section.*

SECTION – I

Solve **any three** questions.

2. a) Define planning and explain different advantages and limitations of planning. **6**

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3. a) Explain hierarchy of needs theory of motivation. **6**

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5. a) Compare between marketing and selling concept. **7**

   b) What are objectives and functions of Production planning and control ? **7**

SECTION – II

Solve **any three** questions :

6. a) What is the meaning of quality of design ? Explain the factors which influence the quality of design. **6**

   b) Explain cause and effect diagram, scatter diagram and Pareto analysis. **7**

Set Q

7. a) Explain the various types of sampling plans which are in practice in industry with their respective acceptance criteria. **6**

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8. a) Explain what you mean by Quality Function Deployment (QFD). **7**

   b) Write short note on FMEA. **7**

9. a) Explain what you mean by benchmarking. **6**

   b) Write procedure for control chart preparation. Explain it for C chart. **7**

SLR-VB – 116

Seat No.	

Set **R**

B.E. (Mechanical) (Part – II) Examination, 2017
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 16-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(20×1=20)**

1) Figurehead role, leader role, liaison role are _____ managerial roles.
A) Interpersonal B) Informational C) Decision D) Leading

2) The success of sampling inspection depends upon _____
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3) In double sampling plan second sample is taken when the number of defective _____
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_____

SLR-VB – 116

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 16-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Figures to **right** indicate **full** marks.*
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SECTION – I

Solve **any three** questions.

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SECTION – II

Solve **any three** questions :

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   b) Explain cause and effect diagram, scatter diagram and Pareto analysis. **7**

Set R

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   b) Explain actual and ideal OC curve for a sampling plan. Also explain all concepts such as Producer's risk, consumer's risk, AQL, LTPD, AOQL etc. **7**

8. a) Explain what you mean by Quality Function Deployment (QFD). **7**

   b) Write short note on FMEA. **7**

9. a) Explain what you mean by benchmarking. **6**

   b) Write procedure for control chart preparation. Explain it for C chart. **7**

SLR-VB – 116

Seat No.	

Set **S**

B.E. (Mechanical) (Part – II) Examination, 2017
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 16-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Note : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
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*3) Figures to **right** indicate **full** marks.*
*4) Make suitable assumptions, if required and state them **clearly**.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **(20×1=20)**

1) _____ management called country club management.
A) 9.1 B) 9.9 C) 5.5 D) 1.9

2) _____ leader uses his or her power very little, if at all, giving subordinates a high degree of independence in their operations.
A) Autocratic B) The free rein C) Democratic D) Ideal

3) The producer can decrease his risk by submitting the lots of _____
A) same as AQL B) better than AQL
C) less than AQL D) only AQL

4) Under Theory _____ Average human being learn, under proper conditions, not only to accept responsibility but also to seek it.
A) W B) X C) Y D) Z

5) For any given 'n' and 'c' there is maximum value of _____ beyond which the average fraction defective passed forward will not rise.
A) AQL B) AOQL C) AOQ D) OK lot

6) Figurehead role, leader role, liaison role are _____ managerial roles.
A) Interpersonal B) Informational C) Decision D) Leading

7) The success of sampling inspection depends upon _____
A) Lot size B) Sample size
C) Acceptance number D) All

8) In double sampling plan second sample is taken when the number of defective _____
A) exceeds c1 but doesn't exceeds c2 B) doesn't exceeds c1
C) exceeds both c1 and c2 D) exceeds c2

P.T.O.

9) The larger the sample size and acceptance number _____ is the slope of OC curve.
A) Straight B) Curve C) Steeper D) Horizontal

10) The producers risk is denoted by _____
A) ρ B) β C) α D) δ

11) In any sampling plan if 'c' is the acceptance number then the rejection number is _____
A) c B) c – 1 C) c + 2 D) c + 1

12) In a sampling plan N = 500, n_1 = 10, n_2 = 8, c_1 = 1, c_2 = 4, if the number of defectives in the 1st sample are 3, then the decision will be _____
A) no rejection B) take a second sample and inspect
C) go with production D) lot ok

13) Quality is defined as _____ for use.
A) Fitness B) Standard C) Requirement D) Availability

14) Cost associated with defective products being shipped to the customers are called as _____
A) Cost of internal failure B) Total cost of failure
C) Rejection cost D) Cost of external failure

15) In _____ concept customer satisfaction is of prime importance.
A) Selling B) Manufacturing C) Marketing D) Business

16) _____ funds are required to meet the working capital needs like investment in the Inventories, debtors, bank balance, cash on hand, marketable security etc.
A) Long term B) Short term C) Middle term D) Fixed

17) _____ involves the introduction of new employees to the enterprise, its function, tasks and people.
A) Planning B) Orienting
C) Probation D) Acclimatization

18) Planning and Marketing Services, Physical Distribution, Selling are basic functions of _____
A) Marketing Manager B) Production Manager
C) General Manager D) Plant Manager

19) The amount of working capital depends _____ upon the volume of business.
A) directly B) inversely C) twice D) no relation

20) Machinery, material handling equipment, tools, jigs, fixtures comes under _____
A) Working capital B) Machinery capital
C) Fixed capital D) Variable capital

_____

SLR-VB – 116

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
INDUSTRIAL AND QUALITY MANAGEMENT

Day and Date : Tuesday, 16-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Figures to **right** indicate **full** marks.*
*2) Make suitable assumptions, if required and state them **clearly**.*
*3) Answer **any three full** question from **each** Section.*

SECTION – I

Solve **any three** questions.

2. a) Define planning and explain different advantages and limitations of planning. **6**

   b) What are types of organization ? Explain problems with organization level. **7**

3. a) Explain hierarchy of needs theory of motivation. **6**

   b) Explain the different types of communication processes. **7**

4. a) Explain the elements for performance appraisal. What are various methods of training managers ? **6**

   b) What are the different leadership styles ? **7**

5. a) Compare between marketing and selling concept. **7**

   b) What are objectives and functions of Production planning and control ? **7**

SECTION – II

Solve **any three** questions :

6. a) What is the meaning of quality of design ? Explain the factors which influence the quality of design. **6**

   b) Explain cause and effect diagram, scatter diagram and Pareto analysis. **7**

Set S

7. a) Explain the various types of sampling plans which are in practice in industry with their respective acceptance criteria. **6**

   b) Explain actual and ideal OC curve for a sampling plan. Also explain all concepts such as Producer's risk, consumer's risk, AQL, LTPD, AOQL etc. **7**

8. a) Explain what you mean by Quality Function Deployment (QFD). **7**

   b) Write short note on FMEA. **7**

9. a) Explain what you mean by benchmarking. **6**

   b) Write procedure for control chart preparation. Explain it for C chart. **7**

SLR-VB – 117

Seat No.	

Set **P**

B.E. (Mech.) (Part – II) Examination, 2017
INDUSTRIAL ENGINEERING

Day and Date : Thursday, 18-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Hydroelectric power plant is an example of _____ type layout.
A) Fixed position layout B) Process layout
C) Product layout D) Group layout

2) Basic fatigue allowance is
A) 6% B) 7% C) 4% D) 2%

3) Observed time is 5 min. and performance rating is 120. The normal time is
A) 0.6 min. B) 1.2 min. C) 6.0 min. D) 12 min.

4) In method study the symbol $\bigcirc$ presents
A) Operation B) Inspection C) Project study D) Delay

5) Light source is required for
A) String diagram B) SIMO chart
C) Chronocycle graph D) Template

6) ILO stands for
A) Indian Labour Organization B) International Labour Organization
C) Indian Legislative Organization D) None of the above

7) Analytical estimation is technique of
A) Work measurement B) Method study
C) Job evaluation D) Merit rating

8) Work sampling is used for
A) Finding utilization of machine B) Job analysis
C) Performance analysis D) Accuracy

9) Which of the following chart requires a time scale ?
   A) Outline process chart B) Flow process chart
   C) Multiple activity chart D) Travel chart

10) Check list method is technique of
   A) Job evaluation B) Incentive scheme
   C) Merit rating D) Method study

11) Removing the chips is an example of
   A) Constant element B) Occasional element
   C) Fixed element D) Foreign element

12) Point rate system is a method of
   A) Merit rating B) Job evaluation
   C) Incentive scheme D) None of the above

13) Travel Chart is useful for
   A) Time study B) Locating the activity and back tracking
   C) Incentive scheme D) None of the above

14) _____ allowance is discretion of the management.
   A) Policy B) Personal C) Fatigue D) Relaxation

15) Product layout is preferred in
   A) Batch type production B) Mass production
   C) Job type production D) None of the above

16) Therbligs are related to
   A) Time study B) Work sampling
   C) Motion study D) Job value

17) 'Critical examination' is involved in
   A) Work measurement B) Method study
   C) Job evaluation D) Merit rating

18) Ergonomics deals with
   A) Anthropometry B) Time measurement
   C) Aesthetic design D) None of the above

19) Performance rating depends upon
   A) Skill of operator B) Educational qualification
   C) Salary D) Overtime

20) 'Halo' effect is observed in
   A) Job evaluation B) Method study
   C) Performance appraisal D) Motion study

SLR-VB – 117

Seat No.	

B.E. (Mech.) (Part – II) Examination, 2017
INDUSTRIAL ENGINEERING

Day and Date : Thursday, 18-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instruction** : Solve **any two** from **each** Section.*

SECTION – I

2. a) Explain the concept of productivity and further elaborate types of productivity. **7**
   b) Explain how inefficient methods of manufacturing affect the productivity. **7**
   c) Explain benefits of productivity to the employer, employee and society. **6**

3. a) Define method study and explain objectives. **7**
   b) Explain with sketch multiple activity chart. **7**
   c) Explain with sketch travel chart. **6**

4. a) Explain with sketch ergonomic consideration for Centre lathe. **7**
   b) Explain with diagram design of workplace layout. **7**
   c) Give the definition of an accident and explain the causes and prevention of accident. **6**

SECTION – II

5. a) Define the work measurement and explain the objectives. **7**
   b) What is an element in time study ? Why is it necessary to breakdown the job into elements ? **7**
   c) Explain how to calculate the standard time of the job. **6**

6. a) Define plant layout and explain objectives of it. **7**
   b) Explain work sampling along with procedure and applications. **7**
   c) Compare product layout with process layout. **6**

7. a) What is job evaluation ? Explain any two methods of it. **7**
   b) What is merit rating ? Explain any two methods of merit rating. **7**
   c) Explain PMTS. **6**

Set P

Set P

SLR-VB – 117

Seat No.	

Set **Q**

B.E. (Mech.) (Part – II) Examination, 2017
INDUSTRIAL ENGINEERING

Day and Date : Thursday, 18-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Therbligs are related to
A) Time study B) Work sampling
C) Motion study D) Job value

2) 'Critical examination' is involved in
A) Work measurement B) Method study
C) Job evaluation D) Merit rating

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A) Anthropometry B) Time measurement
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A) 6% B) 7% C) 4% D) 2%

8) Observed time is 5 min. and performance rating is 120. The normal time is
A) 0.6 min. B) 1.2 min. C) 6.0 min. D) 12 min.

P.T.O.

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10) Light source is required for
A) String diagram B) SIMO chart
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14) Which of the following chart requires a time scale ?
A) Outline process chart B) Flow process chart
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C) Merit rating D) Method study

16) Removing the chips is an example of
A) Constant element B) Occasional element
C) Fixed element D) Foreign element

17) Point rate system is a method of
A) Merit rating B) Job evaluation
C) Incentive scheme D) None of the above

18) Travel Chart is useful for
A) Time study B) Locating the activity and back tracking
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19) _____ allowance is discretion of the management.
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20) Product layout is preferred in
A) Batch type production B) Mass production
C) Job type production D) None of the above

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SLR-VB – 117

Seat No.	

B.E. (Mech.) (Part – II) Examination, 2017
INDUSTRIAL ENGINEERING

Day and Date : Thursday, 18-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instruction** : Solve **any two** from **each** Section.*

SECTION – I

2. a) Explain the concept of productivity and further elaborate types of productivity. **7**
   b) Explain how inefficient methods of manufacturing affect the productivity. **7**
   c) Explain benefits of productivity to the employer, employee and society. **6**

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   b) Explain with sketch multiple activity chart. **7**
   c) Explain with sketch travel chart. **6**

4. a) Explain with sketch ergonomic consideration for Centre lathe. **7**
   b) Explain with diagram design of workplace layout. **7**
   c) Give the definition of an accident and explain the causes and prevention of accident. **6**

SECTION – II

5. a) Define the work measurement and explain the objectives. **7**
   b) What is an element in time study ? Why is it necessary to breakdown the job into elements ? **7**
   c) Explain how to calculate the standard time of the job. **6**

6. a) Define plant layout and explain objectives of it. **7**
   b) Explain work sampling along with procedure and applications. **7**
   c) Compare product layout with process layout. **6**

7. a) What is job evaluation ? Explain any two methods of it. **7**
   b) What is merit rating ? Explain any two methods of merit rating. **7**
   c) Explain PMTS. **6**

Set Q

Set Q

SLR-VB – 117

Seat No.	

Set **R**

B.E. (Mech.) (Part – II) Examination, 2017
INDUSTRIAL ENGINEERING

Day and Date : Thursday, 18-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Removing the chips is an example of
   A) Constant element B) Occasional element
   C) Fixed element D) Foreign element

2) Point rate system is a method of
   A) Merit rating B) Job evaluation
   C) Incentive scheme D) None of the above

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   A) Time study B) Locating the activity and back tracking
   C) Incentive scheme D) None of the above

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7) 'Critical examination' is involved in
   A) Work measurement B) Method study
   C) Job evaluation D) Merit rating

8) Ergonomics deals with
   A) Anthropometry B) Time measurement
   C) Aesthetic design D) None of the above

P.T.O.

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20) Check list method is technique of
   A) Job evaluation B) Incentive scheme
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SLR-VB – 117

Seat No.	

B.E. (Mech.) (Part – II) Examination, 2017
INDUSTRIAL ENGINEERING

Day and Date : Thursday, 18-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instruction** : Solve **any two** from **each** Section.*

SECTION – I

2. a) Explain the concept of productivity and further elaborate types of productivity. **7**
   b) Explain how inefficient methods of manufacturing affect the productivity. **7**
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   c) Give the definition of an accident and explain the causes and prevention of accident. **6**

SECTION – II

5. a) Define the work measurement and explain the objectives. **7**
   b) What is an element in time study ? Why is it necessary to breakdown the job into elements ? **7**
   c) Explain how to calculate the standard time of the job. **6**

6. a) Define plant layout and explain objectives of it. **7**
   b) Explain work sampling along with procedure and applications. **7**
   c) Compare product layout with process layout. **6**

7. a) What is job evaluation ? Explain any two methods of it. **7**
   b) What is merit rating ? Explain any two methods of merit rating. **7**
   c) Explain PMTS. **6**

Set R

Set R

SLR-VB – 117

Seat No.	

Set **S**

B.E. (Mech.) (Part – II) Examination, 2017
INDUSTRIAL ENGINEERING

Day and Date : Thursday, 18-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) ILO stands for
   A) Indian Labour Organization B) International Labour Organization
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2) Analytical estimation is technique of
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   A) Time study
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19) In method study the symbol O presents
   A) Operation B) Inspection C) Project study D) Delay

20) Light source is required for
   A) String diagram
   B) SIMO chart
   C) Chronocycle graph
   D) Template

_____

SLR-VB – 117

Seat No.	

B.E. (Mech.) (Part – II) Examination, 2017
INDUSTRIAL ENGINEERING

Day and Date : Thursday, 18-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instruction** : Solve **any two** from **each** Section.*

SECTION – I

2. a) Explain the concept of productivity and further elaborate types of productivity. **7**
   b) Explain how inefficient methods of manufacturing affect the productivity. **7**
   c) Explain benefits of productivity to the employer, employee and society. **6**

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   c) Give the definition of an accident and explain the causes and prevention of accident. **6**

SECTION – II

5. a) Define the work measurement and explain the objectives. **7**
   b) What is an element in time study ? Why is it necessary to breakdown the job into elements ? **7**
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6. a) Define plant layout and explain objectives of it. **7**
   b) Explain work sampling along with procedure and applications. **7**
   c) Compare product layout with process layout. **6**

7. a) What is job evaluation ? Explain any two methods of it. **7**
   b) What is merit rating ? Explain any two methods of merit rating. **7**
   c) Explain PMTS. **6**

Set S

Set S

SLR-VB – 118

Seat No.	

Set **P**

B.E. (Mechanical) (Part – II) Examination, 2017
MECHATRONICS (Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) The first question from ***each*** *Section (Question No.* ***2*** *and Question No.* ***6****) is* ***compulsory****.*
4) Solve ***any two*** *of the remaining* ***three*** *questions from* ***each*** *Section.*
5) Support your answers with ***neat*** *sketches* ***wherever*** *necessary.*
6) Make suitable assumptions ***if necessary*** *and state them* ***clearly****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) In the OSI model, encryption is handled by the _____ layer.
a) data link b) presentation c) session d) transport

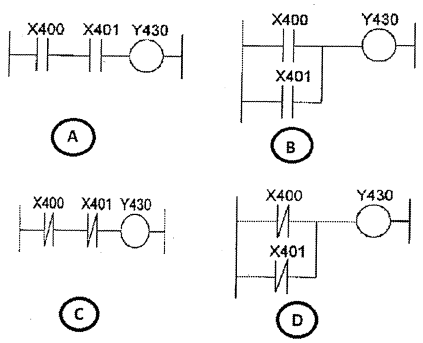
2) The disadvantage of _____ serial data transmission is that it requires start and stop bits since the transmitter and receiver does not share a common clock signal.
a) Synchronous b) Asynchronous c) Asymmetric d) Parallel

3) _____ defines the structure and order in which the data is to be sent. In other words it decides the data format, coding and signal levels.
a) Semantics b) Blabbering c) Syntax d) Timing

4) Manufacturing Automation Protocol (MAP) standard was developed by _____
a) IBM b) Boeing Computer Services
c) General motors d) Dassault Systems

5) Which of the following is most likely to be the voltage level used internally in a PLC, excluding the voltage levels that might occur during conditioning in input/output channels ?
a) 5 V b) 240 V c) 24 V d) 110 V

6) There are five ladder diagrams labelled A, B, C and D. Which one of these represents OR logic ?



a) A b) B c) C d) D

P.T.O.

7) A passive filter is one using only _____
   a) opamps, inductors and capacitors b) resistors, capacitors and inductors
   c) inductors, resistors and opamps d) opamps, capacitors and inductors

8) A relay output channel from a PLC
   (1) is used only DC switching
   (2) Can withstand transient overloads

   Decide whether each of these statements is True (T) or False (F) and thus which option best describes the two statements ?
   a) (1) T and (2) F b) (1) F and (2) T c) (1) T and (2) T d) (1) F and (2) F

9) The Nyquist theorem states that the sampling rate must be _____ the highest frequency.
   a) four times b) equal to c) twice d) half

10) Filters that block all frequencies between two frequencies are known as _____
   a) low pass filters b) band stop filters
   c) high pass filters d) band pass filters

11) Which port can be used as the lower address bus to access external memory ?
   a) Port 0 b) Port 3 c) Port 1 d) Port 2

12) The _____ pin provides output pulse for latching the low-order byte of the address during access to external memory.
   a) PSEN b) RST c) EN d) ALE

13) The correct register pairs for the 8085 are _____
   a) A-B, C-D and E-H b) E-C, B-D and H-L
   c) B-D, C-H and E-L d) B-C, D-E and H-L

14) The 8085 interrupts are classified as _____ and _____ interrupts.
   a) Hardware and software b) Fast and slow
   c) Internal and external d) High state and low state

15) In a stepper motor, the speed of rotation determined by the _____
   a) Magnitude of the voltage applied b) Load applied to the motor
   c) Current supplied to the motor d) Frequency of the waveforms used

16) Pneumatic actuators are best suited when the situation warrants _____
   a) Low power density, low cost, very high accuracy
   b) Low power density, low cost, moderate accuracy, quick installation
   c) Moderate power density, low cost, very high accuracy
   d) High power density, low cost, very high accuracy

17) The measure of sensitivity of a resistive transducer is given by
   a) Gauge factor b) X factor c) Size factor d) Length factor

18) The _____ of a transducer is the ability to give the same output when used to measure a constant input over a period of time.
   a) Resolution b) Repeatability c) Response time d) Stability

19) In order to reduce loading error in potentiometric devices it is recommended to use a _____ power source.
   a) Stabilized b) Low voltage c) High voltage d) Fluctuating

20) LVDT is a _____ transducer.
   a) Resistive b) Inductive c) Capacitive d) All of the above

_____

SLR-VB – 118

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
MECHATRONICS (Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) The first question from **each** Section (Question No. **2** and Question No. **6**) is **compulsory**.*

*2) Solve **any two** of the remaining **three** questions from **each** Section.*

*3) Support your answers with **neat** sketches **wherever** necessary.*

*4) Make suitable assumptions **if necessary** and state them **clearly**.*

SECTION – I

2. Solve **any four** questions : **20**

a) Discuss the working of an automatic camera from a mechatronic perspective.

b) Discuss dynamic characteristics of sensors.

c) What do you understand by the term “Signal Processing” ?

d) Define the terms : Microcontroller, Microprocessor, Assembly Language, Address Latch Enable and Non-maskable Interrupt.

e) Discuss car engine management as a mechatronic system.

f) Discuss ADC and DAC.

3. **10**

a) Discuss sensor classification in detail. **6**

b) Sketch the 8051 pin diagram with correct pin labels. **4**

4. **10**

a) Discuss operating characteristics of DC series, shunt and separately excited motors. **6**

b) What is mechatronics ? What are its key elements ? **4**

5. **10**

a) Discuss in brief data acquisition, data recording and logging systems. **6**

b) Using the case of a typical temperature recording system as an example, explain how you will interface sensors and output display to the 8051 microcontroller. **4**

SECTION – II

6. Solve **any four** questions : **(4×5=20)**

   a) Discuss the advantages of using PLCs for control.

   b) What are the different network topologies ?

   c) What do you understand by the term Artificial Intelligence ? List its applications.

   d) Discuss applications of Mechatronics in MEMS.

   e) Explain in brief LAN, MAN and WAN.

   f) Discuss applications of Mechatronics in Automotive Systems.

7. **10**

   a) What is fuzzy logic ? List its applications. **6**

   b) Draw the ladder diagram for a cyclic timing circuit that will switch on a pump for 120 seconds and then off for 60 seconds. **4**

8. **10**

   a) Discuss the OSI model for network communication. **6**

   b) Draw a ladder diagram for a timing circuit that will switch on a light bulb for 30 seconds and then turn it off. **4**

9. **10**

   a) Discuss the role of mechatronics in Robotics. **6**

   b) Draw the ladder diagram for a motor staring circuit which is to operate as follows : The motor is switched on by pressing a spring return push button start switch via an internal relay. The motor remains in operation till another spring-return push button stop switch is pressed. **4**

SLR-VB – 118

Seat No.	

Set **Q**

B.E. (Mechanical) (Part – II) Examination, 2017
MECHATRONICS (Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) The first question from ***each*** *Section (Question No.* ***2*** *and Question No.* ***6****) is* ***compulsory****.*
4) Solve ***any two*** *of the remaining* ***three*** *questions from* ***each*** *Section.*
5) Support your answers with ***neat*** *sketches* ***wherever*** *necessary.*
6) Make suitable assumptions ***if necessary*** *and state them* ***clearly****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Pneumatic actuators are best suited when the situation warrants _____
   a) Low power density, low cost, very high accuracy
   b) Low power density, low cost, moderate accuracy, quick installation
   c) Moderate power density, low cost, very high accuracy
   d) High power density, low cost, very high accuracy

2) The measure of sensitivity of a resistive transducer is given by
   a) Gauge factor b) X factor c) Size factor d) Length factor

3) The _____ of a transducer is the ability to give the same output when used to measure a constant input over a period of time.
   a) Resolution b) Repeatability c) Response time d) Stability

4) In order to reduce loading error in potentiometric devices it is recommended to use a _____ power source.
   a) Stabilized b) Low voltage c) High voltage d) Fluctuating

5) LVDT is a _____ transducer.
   a) Resistive b) Inductive c) Capacitive d) All of the above

6) In the OSI model, encryption is handled by the _____ layer.
   a) data link b) presentation c) session d) transport

7) The disadvantage of _____ serial data transmission is that it requires start and stop bits since the transmitter and receiver does not share a common clock signal.
   a) Synchronous b) Asynchronous c) Asymmetric d) Parallel

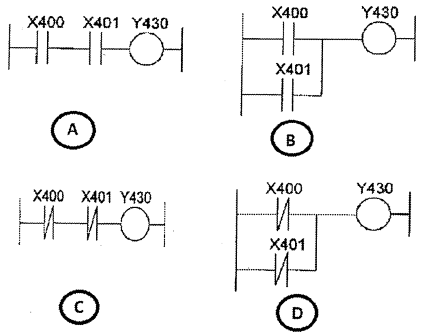
8) _____ defines the structure and order in which the data is to be sent. In other words it decides the data format, coding and signal levels.
   a) Semantics b) Blabbering c) Syntax d) Timing

9) Manufacturing Automation Protocol (MAP) standard was developed by _____
   a) IBM b) Boeing Computer Services
   c) General motors d) Dassault Systems

P.T.O.

10) Which of the following is most likely to be the voltage level used internally in a PLC, excluding the voltage levels that might occur during conditioning in input/output channels ?
a) 5 V b) 240 V c) 24 V d) 110 V

11) There are five ladder diagrams labelled A, B, C and D. Which one of these represents OR logic ?



a) A b) B c) C d) D

12) A passive filter is one using only _____
a) opamps, inductors and capacitors b) resistors, capacitors and inductors
c) inductors, resistors and opamps d) opamps, capacitors and inductors

13) A relay output channel from a PLC
(1) is used only DC switching
(2) Can withstand transient overloads

Decide whether each of these statements is True (T) or False (F) and thus which option best describes the two statements ?
a) (1) T and (2) F b) (1) F and (2) T c) (1) T and (2) T d) (1) F and (2) F

14) The Nyquist theorem states that the sampling rate must be _____ the highest frequency.
a) four times b) equal to c) twice d) half

15) Filters that block all frequencies between two frequencies are known as _____
a) low pass filters b) band stop filters
c) high pass filters d) band pass filters

16) Which port can be used as the lower address bus to access external memory ?
a) Port 0 b) Port 3 c) Port 1 d) Port 2

17) The _____ pin provides output pulse for latching the low-order byte of the address during access to external memory.
a) PSEN b) RST c) EN d) ALE

18) The correct register pairs for the 8085 are _____
a) A-B, C-D and E-H b) E-C, B-D and H-L
c) B-D, C-H and E-L d) B-C, D-E and H-L

19) The 8085 interrupts are classified as _____ and _____ interrupts.
a) Hardware and software b) Fast and slow
c) Internal and external d) High state and low state

20) In a stepper motor, the speed of rotation determined by the _____
a) Magnitude of the voltage applied b) Load applied to the motor
c) Current supplied to the motor d) Frequency of the waveforms used

_____

SLR-VB – 118

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
MECHATRONICS (Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) The first question from **each** Section (Question No. **2** and Question No. **6**) is **compulsory**.*

*2) Solve **any two** of the remaining **three** questions from **each** Section.*

*3) Support your answers with **neat** sketches **wherever** necessary.*

*4) Make suitable assumptions **if necessary** and state them **clearly**.*

SECTION – I

2. Solve **any four** questions : **20**

a) Discuss the working of an automatic camera from a mechatronic perspective.

b) Discuss dynamic characteristics of sensors.

c) What do you understand by the term “Signal Processing” ?

d) Define the terms : Microcontroller, Microprocessor, Assembly Language, Address Latch Enable and Non-maskable Interrupt.

e) Discuss car engine management as a mechatronic system.

f) Discuss ADC and DAC.

3. **10**

a) Discuss sensor classification in detail. **6**

b) Sketch the 8051 pin diagram with correct pin labels. **4**

4. **10**

a) Discuss operating characteristics of DC series, shunt and separately excited motors. **6**

b) What is mechatronics ? What are its key elements ? **4**

5. **10**

a) Discuss in brief data acquisition, data recording and logging systems. **6**

b) Using the case of a typical temperature recording system as an example, explain how you will interface sensors and output display to the 8051 microcontroller. **4**

SECTION – II

6. Solve **any four** questions : **(4×5=20)**

   a) Discuss the advantages of using PLCs for control.

   b) What are the different network topologies ?

   c) What do you understand by the term Artificial Intelligence ? List its applications.

   d) Discuss applications of Mechatronics in MEMS.

   e) Explain in brief LAN, MAN and WAN.

   f) Discuss applications of Mechatronics in Automotive Systems.

7. **10**

   a) What is fuzzy logic ? List its applications. **6**

   b) Draw the ladder diagram for a cyclic timing circuit that will switch on a pump for 120 seconds and then off for 60 seconds. **4**

8. **10**

   a) Discuss the OSI model for network communication. **6**

   b) Draw a ladder diagram for a timing circuit that will switch on a light bulb for 30 seconds and then turn it off. **4**

9. **10**

   a) Discuss the role of mechatronics in Robotics. **6**

   b) Draw the ladder diagram for a motor staring circuit which is to operate as follows : The motor is switched on by pressing a spring return push button start switch via an internal relay. The motor remains in operation till another spring-return push button stop switch is pressed. **4**

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SLR-VB – 118

Seat No.	

Set **R**

B.E. (Mechanical) (Part – II) Examination, 2017
MECHATRONICS (Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) The first question from ***each*** *Section (Question No.* ***2*** *and Question No.* ***6****) is* ***compulsory****.*
4) Solve ***any two*** *of the remaining* ***three*** *questions from* ***each*** *Section.*
5) Support your answers with ***neat*** *sketches* ***wherever*** *necessary.*
6) Make suitable assumptions ***if necessary*** *and state them* ***clearly****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Which port can be used as the lower address bus to access external memory ?
a) Port 0 b) Port 3 c) Port 1 d) Port 2

2) The _____ pin provides output pulse for latching the low-order byte of the address during access to external memory.
a) PSEN b) RST c) EN d) ALE

3) The correct register pairs for the 8085 are _____
a) A-B, C-D and E-H b) E-C, B-D and H-L
c) B-D, C-H and E-L d) B-C, D-E and H-L

4) The 8085 interrupts are classified as _____ and _____ interrupts.
a) Hardware and software b) Fast and slow
c) Internal and external d) High state and low state

5) In a stepper motor, the speed of rotation determined by the _____
a) Magnitude of the voltage applied b) Load applied to the motor
c) Current supplied to the motor d) Frequency of the waveforms used

6) Pneumatic actuators are best suited when the situation warrants _____
a) Low power density, low cost, very high accuracy
b) Low power density, low cost, moderate accuracy, quick installation
c) Moderate power density, low cost, very high accuracy
d) High power density, low cost, very high accuracy

7) The measure of sensitivity of a resistive transducer is given by
a) Gauge factor b) X factor c) Size factor d) Length factor

8) The _____ of a transducer is the ability to give the same output when used to measure a constant input over a period of time.
a) Resolution b) Repeatability c) Response time d) Stability

P.T.O.

9) In order to reduce loading error in potentiometric devices it is recommended to use a _____ power source.
a) Stabilized b) Low voltage c) High voltage d) Fluctuating

10) LVDT is a _____ transducer.
a) Resistive b) Inductive c) Capacitive d) All of the above

11) In the OSI model, encryption is handled by the _____ layer.
a) data link b) presentation c) session d) transport

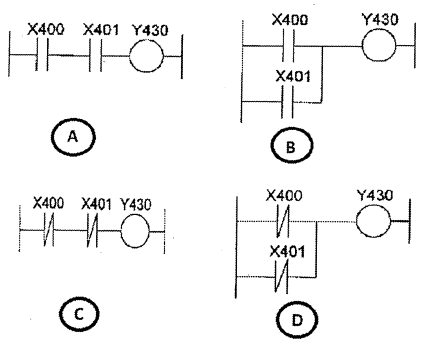
12) The disadvantage of _____ serial data transmission is that it requires start and stop bits since the transmitter and receiver does not share a common clock signal.
a) Synchronous b) Asynchronous c) Asymmetric d) Parallel

13) _____ defines the structure and order in which the data is to be sent. In other words it decides the data format, coding and signal levels.
a) Semantics b) Blabbering c) Syntax d) Timing

14) Manufacturing Automation Protocol (MAP) standard was developed by _____
a) IBM b) Boeing Computer Services
c) General motors d) Dassault Systems

15) Which of the following is most likely to be the voltage level used internally in a PLC, excluding the voltage levels that might occur during conditioning in input/output channels ?
a) 5 V b) 240 V c) 24 V d) 110 V

16) There are five ladder diagrams labelled A, B, C and D. Which one of these represents OR logic ?



a) A b) B c) C d) D

17) A passive filter is one using only _____
a) opamps, inductors and capacitors b) resistors, capacitors and inductors
c) inductors, resistors and opamps d) opamps, capacitors and inductors

18) A relay output channel from a PLC
(1) is used only DC switching
(2) Can withstand transient overloads

Decide whether each of these statements is True (T) or False (F) and thus which option best describes the two statements ?
a) (1) T and (2) F b) (1) F and (2) T c) (1) T and (2) T d) (1) F and (2) F

19) The Nyquist theorem states that the sampling rate must be _____ the highest frequency.
a) four times b) equal to c) twice d) half

20) Filters that block all frequencies between two frequencies are known as _____
a) low pass filters b) band stop filters
c) high pass filters d) band pass filters

_____

SLR-VB – 118

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
MECHATRONICS (Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) The first question from **each** Section (Question No. **2** and Question No. **6**) is **compulsory**.*

*2) Solve **any two** of the remaining **three** questions from **each** Section.*

*3) Support your answers with **neat** sketches **wherever** necessary.*

*4) Make suitable assumptions **if necessary** and state them **clearly**.*

SECTION – I

2. Solve **any four** questions : **20**

   a) Discuss the working of an automatic camera from a mechatronic perspective.

   b) Discuss dynamic characteristics of sensors.

   c) What do you understand by the term “Signal Processing” ?

   d) Define the terms : Microcontroller, Microprocessor, Assembly Language, Address Latch Enable and Non-maskable Interrupt.

   e) Discuss car engine management as a mechatronic system.

   f) Discuss ADC and DAC.

3. **10**

   a) Discuss sensor classification in detail. **6**

   b) Sketch the 8051 pin diagram with correct pin labels. **4**

4. **10**

   a) Discuss operating characteristics of DC series, shunt and separately excited motors. **6**

   b) What is mechatronics ? What are its key elements ? **4**

5. **10**

   a) Discuss in brief data acquisition, data recording and logging systems. **6**

   b) Using the case of a typical temperature recording system as an example, explain how you will interface sensors and output display to the 8051 microcontroller. **4**

SECTION – II

6. Solve **any four** questions : **(4×5=20)**

   a) Discuss the advantages of using PLCs for control.

   b) What are the different network topologies ?

   c) What do you understand by the term Artificial Intelligence ? List its applications.

   d) Discuss applications of Mechatronics in MEMS.

   e) Explain in brief LAN, MAN and WAN.

   f) Discuss applications of Mechatronics in Automotive Systems.

7. **10**

   a) What is fuzzy logic ? List its applications. **6**

   b) Draw the ladder diagram for a cyclic timing circuit that will switch on a pump for 120 seconds and then off for 60 seconds. **4**

8. **10**

   a) Discuss the OSI model for network communication. **6**

   b) Draw a ladder diagram for a timing circuit that will switch on a light bulb for 30 seconds and then turn it off. **4**

9. **10**

   a) Discuss the role of mechatronics in Robotics. **6**

   b) Draw the ladder diagram for a motor staring circuit which is to operate as follows : The motor is switched on by pressing a spring return push button start switch via an internal relay. The motor remains in operation till another spring-return push button stop switch is pressed. **4**

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SLR-VB – 118

Seat No.	

Set **S**

B.E. (Mechanical) (Part – II) Examination, 2017
MECHATRONICS (Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

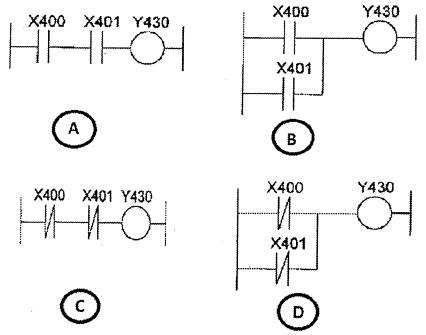
Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) The first question from ***each*** *Section (Question No.* ***2*** *and Question No.* ***6****) is* ***compulsory****.*
4) Solve ***any two*** *of the remaining* ***three*** *questions from* ***each*** *Section.*
5) Support your answers with ***neat*** *sketches* ***wherever*** *necessary.*
6) Make suitable assumptions ***if necessary*** *and state them* ***clearly****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) There are five ladder diagrams labelled A, B, C and D. Which one of these represents OR logic ?



a) A b) B c) C d) D

2) A passive filter is one using only _____
a) opamps, inductors and capacitors b) resistors, capacitors and inductors
c) inductors, resistors and opamps d) opamps, capacitors and inductors

3) A relay output channel from a PLC
(1) is used only DC switching
(2) Can withstand transient overloads
Decide whether each of these statements is True (T) or False (F) and thus which option best describes the two statements ?
a) (1) T and (2) F b) (1) F and (2) T c) (1) T and (2) T d) (1) F and (2) F

4) The Nyquist theorem states that the sampling rate must be _____ the highest frequency.
a) four times b) equal to c) twice d) half

5) Filters that block all frequencies between two frequencies are known as _____
a) low pass filters b) band stop filters
c) high pass filters d) band pass filters

P.T.O.

6) Which port can be used as the lower address bus to access external memory ?
   a) Port 0 b) Port 3 c) Port 1 d) Port 2

7) The _____ pin provides output pulse for latching the low-order byte of the address during access to external memory.
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   a) A-B, C-D and E-H b) E-C, B-D and H-L
   c) B-D, C-H and E-L d) B-C, D-E and H-L

9) The 8085 interrupts are classified as _____ and _____ interrupts.
   a) Hardware and software b) Fast and slow
   c) Internal and external d) High state and low state

10) In a stepper motor, the speed of rotation determined by the _____
   a) Magnitude of the voltage applied b) Load applied to the motor
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11) Pneumatic actuators are best suited when the situation warrants _____
   a) Low power density, low cost, very high accuracy
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   c) Moderate power density, low cost, very high accuracy
   d) High power density, low cost, very high accuracy

12) The measure of sensitivity of a resistive transducer is given by
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13) The _____ of a transducer is the ability to give the same output when used to measure a constant input over a period of time.
   a) Resolution b) Repeatability c) Response time d) Stability

14) In order to reduce loading error in potentiometric devices it is recommended to use a _____ power source.
   a) Stabilized b) Low voltage c) High voltage d) Fluctuating

15) LVDT is a _____ transducer.
   a) Resistive b) Inductive c) Capacitive d) All of the above

16) In the OSI model, encryption is handled by the _____ layer.
   a) data link b) presentation c) session d) transport

17) The disadvantage of _____ serial data transmission is that it requires start and stop bits since the transmitter and receiver does not share a common clock signal.
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18) _____ defines the structure and order in which the data is to be sent. In other words it decides the data format, coding and signal levels.
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19) Manufacturing Automation Protocol (MAP) standard was developed by _____
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20) Which of the following is most likely to be the voltage level used internally in a PLC, excluding the voltage levels that might occur during conditioning in input/output channels ?
   a) 5 V b) 240 V c) 24 V d) 110 V

_____

SLR-VB – 118

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
MECHATRONICS (Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) The first question from **each** Section (Question No. **2** and Question No. **6**) is **compulsory**.*

*2) Solve **any two** of the remaining **three** questions from **each** Section.*

*3) Support your answers with **neat** sketches **wherever** necessary.*

*4) Make suitable assumptions **if necessary** and state them **clearly**.*

SECTION – I

2. Solve **any four** questions : **20**

a) Discuss the working of an automatic camera from a mechatronic perspective.

b) Discuss dynamic characteristics of sensors.

c) What do you understand by the term “Signal Processing” ?

d) Define the terms : Microcontroller, Microprocessor, Assembly Language, Address Latch Enable and Non-maskable Interrupt.

e) Discuss car engine management as a mechatronic system.

f) Discuss ADC and DAC.

3. **10**

a) Discuss sensor classification in detail. **6**

b) Sketch the 8051 pin diagram with correct pin labels. **4**

4. **10**

a) Discuss operating characteristics of DC series, shunt and separately excited motors. **6**

b) What is mechatronics ? What are its key elements ? **4**

5. **10**

a) Discuss in brief data acquisition, data recording and logging systems. **6**

b) Using the case of a typical temperature recording system as an example, explain how you will interface sensors and output display to the 8051 microcontroller. **4**

SECTION – II

6. Solve **any four** questions : **(4×5=20)**

   a) Discuss the advantages of using PLCs for control.

   b) What are the different network topologies ?

   c) What do you understand by the term Artificial Intelligence ? List its applications.

   d) Discuss applications of Mechatronics in MEMS.

   e) Explain in brief LAN, MAN and WAN.

   f) Discuss applications of Mechatronics in Automotive Systems.

7. **10**

   a) What is fuzzy logic ? List its applications. **6**

   b) Draw the ladder diagram for a cyclic timing circuit that will switch on a pump for 120 seconds and then off for 60 seconds. **4**

8. **10**

   a) Discuss the OSI model for network communication. **6**

   b) Draw a ladder diagram for a timing circuit that will switch on a light bulb for 30 seconds and then turn it off. **4**

9. **10**

   a) Discuss the role of mechatronics in Robotics. **6**

   b) Draw the ladder diagram for a motor staring circuit which is to operate as follows : The motor is switched on by pressing a spring return push button start switch via an internal relay. The motor remains in operation till another spring-return push button stop switch is pressed. **4**

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SLR-VB – 119

Seat No.	

Set **P**

B.E. (Mech.) (Part – II) Examination, 2017
COMPUTATIONAL FLUID DYNAMICS
(Professional Elective – 4)

Day and Date : Saturday, 20-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data if ***necessary****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Use of non-programmable calculator is ***allowed***
5) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
6) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternative : **(20×1=20)**

1) CFD is a
   a) Design Tool b) Research Tool
   c) Numerical Tool d) All of the above

2) Generally meshing is involved in which of _____ CFD step.
   a) Pre-processor b) Post processor
   c) Solver d) All of the above

3) The grid generation term are generally used for
   a) Selection of physical model
   b) Definition of fluid property
   c) Specification of boundary condition
   d) Sub division of domain into a no. of smaller sub-domain

4) Which of the following is a method of numerical solution technique ?
   a) Finite difference method b) Finite volume method
   c) Finite element method d) All of the above

5) Reynolds number is
   a) $\rho\nu L / \mu$ b) $\rho\mu L / \nu$ c) $\rho\mu\nu / L$ d) $\nu\mu L / \rho$

6) Physical principle of continuity equation is
   a) Mass is conserved
   b) Energy is transferred
   c) Energy is created
   d) Moment and couple are formed at respective points

7) The mass flow of moving fluid across any fixed surfaces is given as
   a) ρdv b) ρvds c) ρds d) Vdvds

8) In Cartesian coordinate system for infinitely small element fixed in space, the velocity and density are the function of
   a) Mass and moment
   b) Energy
   c) Moment and couple
   d) Space and time

9) Which are the forces acting on fluid element in momentum equation ?
   a) Body force and surface force
   b) Tension and compression force
   c) Tension and shear force
   d) Torsion and tension force

10) SIMPLE stands for _____ for Pressure-Linked Equations.
   a) Semi-Implicit Method
   b) Simple-Implicit Method
   c) None of above
   d) All of above

11) Contour plot gives the advantage as compared to other is
   a) It illustrates global nature of set of CFD result all in one view
   b) It gives clear view
   c) It gives faster plot
   d) It gives 2D representation

12) To display velocity at discrete grid point along with magnitude and direction which plot is used
   a) Contour plot b) Vector plot c) Mesh plot d) Composite plot

13) Lax Wendroff technique is
   a) Explicit finite difference method
   b) Implicit finite difference method
   c) All of the above
   d) None of the above

14) The technique used for solution of elliptical partial differential equation is
   a) Lax Wendroff technique
   b) Relaxation technique
   c) Maccormack's technique
   d) ADI technique

15) CFD technique is used for solving parabolic, hyperbolic and explicit partial differential equation is
   a) Lax Wendroff tech.
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   d) ADI technique

16) In backward difference scheme use the information at the
   a) Right of grid point
   b) Left of grid point
   c) Bottom of grid point
   d) Top of grid point

17) Find a solution by solving an equation involving both the current state of the system and lateral one is called as
   a) Current approach
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18) The boundary condition is used for one dimensional conduction problem is
   a) Neumann boundary condition
   b) Type II boundary condition
   c) Dirichlet boundary condition
   d) None of above

19) For Turbulent Flow Reynolds number Re is
   a) Re > 1000 b) Re > 2000 c) Re > 3000 d) Re > 4000

20) Correct CFD analysis sequence is
   a) Modeling – Meshing – Solver – Postprocessor
   b) Modeling – Solver – Meshing – Postprocessor
   c) Meshing – Modeling – Solver – Postprocessor
   d) Modeling – Postprocessor – Meshing – Solver

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SLR-VB – 119

Seat No.	

B.E. (Mech.) (Part – II) Examination, 2017
COMPUTATIONAL FLUID DYNAMICS
(Professional Elective – 4)

Day and Date : Saturday, 20-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Solve **any two** questions from **each** Section.*
*2) Assume suitable data if **necessary**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Use of non-programmable calculator is **allowed***

SECTION – I

2. a) Derive continuity equations for a 2-D Cartesian element. **7**
   b) Give applications of CFD. **6**
   c) What is an Implicit Approach ? Explain with the help of example. **7**

3. a) Consider a large plane wall of thickness L = 0.4 m, Thermal Conductivity K=2.3 W/m°C and the left side of the wall is maintained at a constant temperature of 80°C while the right side loses heat by convection to the surrounding air T_∞ =15°C with a heat transfer of h = 24 W/m^2°C. Assuming steady one dimensional heat transfer and taking the nodal spacing to be 0.1 m, A= 20 m^2.
      i) Obtain the finite difference formulation for all nodes
      ii) Determine the nodal temperatures by solving those equations
      iii) Evaluate the rate of heat transfer through the wall. **10**
   b) Consider steady two dimensional heat transfer in a long solid bar of a square cross section is given in the below Figure 1. The measured temperatures at selected points of the outer surfaces are as shown .The thermal conductivity of the body K= 45 W/m °C and there is no heat generation. Using the FDM with a mesh size of $\Delta x = \Delta y$ = 2 cm determine the temperatures at the indicated points in the medium. **10**

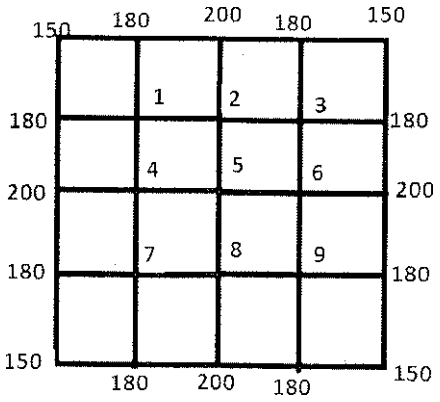

Figure 1

Set P

4. a) Consider a large uranium plate of thickness L = 4 cm, K = 28 W/m°C and $\alpha = 12.5 \times 10^{-5}$ m^2/s that is initially at a uniform temperature of 200°C. Heat is generated uniformly in the plate at a constant rate of $\dot{e} = 5 \times 10^6$ w/m^3. At time t = 0, one side of the plate is brought into contact with iced water and is maintained at 0°C at all times while the other side is subjected to convection to an environment at T_∞ = 30°C with a heat transfer coefficient h = 45 w/m^2°C, as shown in Figure 2 below considering a total of three equally spaced node in the medium, two at the boundaries and one at the middle,estimate the exposed surface temperature of the plate 2.5 min. after the start of cooling using the explicit method. **10**

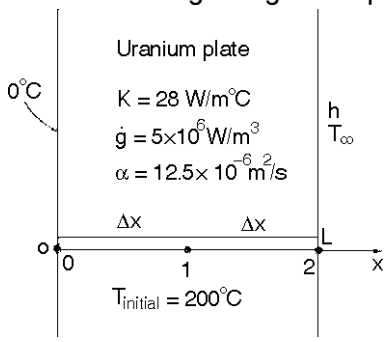

Figure 2

b) Explain Uniform and non-uniform grids. **5**

c) Explain how the finite difference form of ID-heat conduction problem is obtained by using energy balance method. **5**

SECTION – II

5. a) Explain step-by-step procedure for the SIMPLE algorithm of Patankar and Spalding. **7**

b) Explain the FVM for steady one-dimensional convection and diffusion. **6**

c) Write short note on Stream function and Vorticity Method. **7**

6. a) Write short notes on unstructured grid for viscous flow. **7**

b) Explain briefly Lax-Wendroff technique in finite difference method. **6**

c) Explain different plots of computer graphics in CFD. **7**

7. a) Explain the effect of turbulence fluctuations on properties of the mean flow. **6**

b) Write short note on K-ω Models. **6**

c) Explain Relaxation technique for convergence rate of the iteration sequence in CFD. **8**

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SLR-VB – 119

Seat No.	

Set **Q**

B.E. (Mech.) (Part – II) Examination, 2017
COMPUTATIONAL FLUID DYNAMICS
(Professional Elective – 4)

Day and Date : Saturday, 20-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*
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*3) Figures to the **right** indicate **full** marks.*
*4) Use of non-programmable calculator is **allowed***
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternative : **(20×1=20)**

1) In backward difference scheme use the information at the
   a) Right of grid point b) Left of grid point
   c) Bottom of grid point d) Top of grid point

2) Find a solution by solving an equation involving both the current state of the system and lateral one is called as
   a) Current approach b) Explicit approach
   c) Implicit approach d) Lateral approach

3) The boundary condition is used for one dimensional conduction problem is
   a) Neumann boundary condition b) Type II boundary condition
   c) Dirichlet boundary condition d) None of above

4) For Turbulent Flow Reynolds number Re is
   a) Re > 1000 b) Re > 2000 c) Re > 3000 d) Re > 4000

5) Correct CFD analysis sequence is
   a) Modeling – Meshing – Solver – Postprocessor
   b) Modeling – Solver – Meshing – Postprocessor
   c) Meshing – Modeling – Solver – Postprocessor
   d) Modeling – Postprocessor – Meshing – Solver

6) CFD is a
   a) Design Tool b) Research Tool
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7) Generally meshing is involved in which of _____ CFD step.
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   c) Finite element method
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   b) $\rho\mu L / \nu$
   c) $\rho\mu\nu / L$
   d) $\nu\mu L / \rho$

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SLR-VB – 119

Seat No.	

B.E. (Mech.) (Part – II) Examination, 2017
COMPUTATIONAL FLUID DYNAMICS
(Professional Elective – 4)

Day and Date : Saturday, 20-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Solve **any two** questions from **each** Section.*
*2) Assume suitable data if **necessary**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Use of non-programmable calculator is **allowed***

SECTION – I

2. a) Derive continuity equations for a 2-D Cartesian element. **7**
   b) Give applications of CFD. **6**
   c) What is an Implicit Approach ? Explain with the help of example. **7**

3. a) Consider a large plane wall of thickness L = 0.4 m, Thermal Conductivity K=2.3 W/m°C and the left side of the wall is maintained at a constant temperature of 80°C while the right side loses heat by convection to the surrounding air T_∞ =15°C with a heat transfer of h = 24 W/m^2°C. Assuming steady one dimensional heat transfer and taking the nodal spacing to be 0.1 m, A= 20 m^2.
      i) Obtain the finite difference formulation for all nodes
      ii) Determine the nodal temperatures by solving those equations
      iii) Evaluate the rate of heat transfer through the wall. **10**
   b) Consider steady two dimensional heat transfer in a long solid bar of a square cross section is given in the below Figure 1. The measured temperatures at selected points of the outer surfaces are as shown .The thermal conductivity of the body K= 45 W/m °C and there is no heat generation. Using the FDM with a mesh size of $\Delta x = \Delta y$ = 2 cm determine the temperatures at the indicated points in the medium. **10**

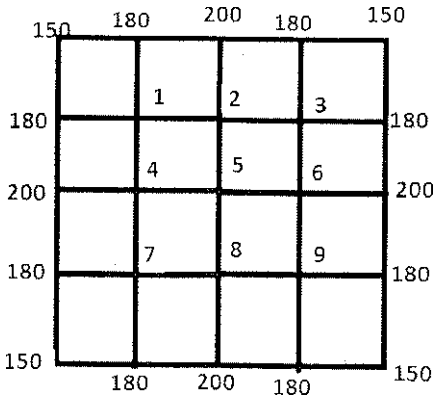

Figure 1

Set Q

4. a) Consider a large uranium plate of thickness L = 4 cm, K = 28 W/m°C and $\alpha = 12.5 \times 10^{-5}$ m^2/s that is initially at a uniform temperature of 200°C. Heat is generated uniformly in the plate at a constant rate of $\dot{e} = 5 \times 10^6$ w/m^3. At time t = 0, one side of the plate is brought into contact with iced water and is maintained at 0°C at all times while the other side is subjected to convection to an environment at T_∞ = 30°C with a heat transfer coefficient h = 45 w/m^2°C, as shown in Figure 2 below considering a total of three equally spaced node in the medium, two at the boundaries and one at the middle,estimate the exposed surface temperature of the plate 2.5 min. after the start of cooling using the explicit method. **10**

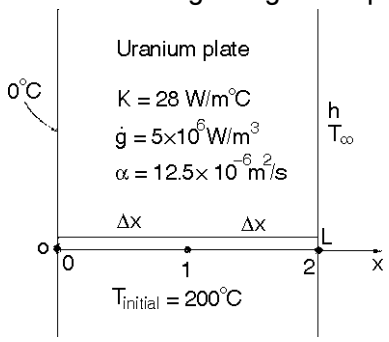

Figure 2

b) Explain Uniform and non-uniform grids. **5**

c) Explain how the finite difference form of ID-heat conduction problem is obtained by using energy balance method. **5**

SECTION – II

5. a) Explain step-by-step procedure for the SIMPLE algorithm of Patankar and Spalding. **7**

b) Explain the FVM for steady one-dimensional convection and diffusion. **6**

c) Write short note on Stream function and Vorticity Method. **7**

6. a) Write short notes on unstructured grid for viscous flow. **7**

b) Explain briefly Lax-Wendroff technique in finite difference method. **6**

c) Explain different plots of computer graphics in CFD. **7**

7. a) Explain the effect of turbulence fluctuations on properties of the mean flow. **6**

b) Write short note on K-ω Models. **6**

c) Explain Relaxation technique for convergence rate of the iteration sequence in CFD. **8**

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SLR-VB – 119

Seat No.	

Set **R**

B.E. (Mech.) (Part – II) Examination, 2017
COMPUTATIONAL FLUID DYNAMICS
(Professional Elective – 4)

Day and Date : Saturday, 20-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*
*2) Assume suitable data if **necessary**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Use of non-programmable calculator is **allowed***
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternative : **(20×1=20)**

1) Contour plot gives the advantage as compared to other is
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   b) It gives clear view
   c) It gives faster plot
   d) It gives 2D representation

2) To display velocity at discrete grid point along with magnitude and direction which plot is used
   a) Contour plot b) Vector plot c) Mesh plot d) Composite plot

3) Lax Wendroff technique is
   a) Explicit finite difference method b) Implicit finite difference method
   c) All of the above d) None of the above

4) The technique used for solution of elliptical partial differential equation is
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7) Find a solution by solving an equation involving both the current state of the system and lateral one is called as
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P.T.O.

8) The boundary condition is used for one dimensional conduction problem is
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   b) Type II boundary condition
   c) Dirichlet boundary condition
   d) None of above

9) For Turbulent Flow Reynolds number Re is
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SLR-VB – 119

Seat No.	

B.E. (Mech.) (Part – II) Examination, 2017
COMPUTATIONAL FLUID DYNAMICS
(Professional Elective – 4)

Day and Date : Saturday, 20-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Solve **any two** questions from **each** Section.*
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SECTION – I

2. a) Derive continuity equations for a 2-D Cartesian element. **7**
   b) Give applications of CFD. **6**
   c) What is an Implicit Approach ? Explain with the help of example. **7**

3. a) Consider a large plane wall of thickness L = 0.4 m, Thermal Conductivity K=2.3 W/m°C and the left side of the wall is maintained at a constant temperature of 80°C while the right side loses heat by convection to the surrounding air T_∞ =15°C with a heat transfer of h = 24 W/m^2°C. Assuming steady one dimensional heat transfer and taking the nodal spacing to be 0.1 m, A= 20 m^2.
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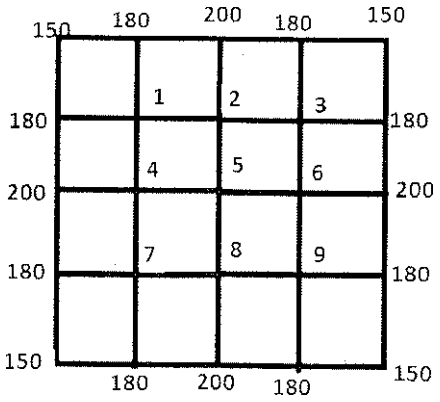

Figure 1

Set R

4. a) Consider a large uranium plate of thickness L = 4 cm, K = 28 W/m°C and $\alpha = 12.5 \times 10^{-5}$ m^2/s that is initially at a uniform temperature of 200°C. Heat is generated uniformly in the plate at a constant rate of $\dot{e} = 5 \times 10^6$ w/m^3. At time t = 0, one side of the plate is brought into contact with iced water and is maintained at 0°C at all times while the other side is subjected to convection to an environment at T_∞ = 30°C with a heat transfer coefficient h = 45 w/m^2°C, as shown in Figure 2 below considering a total of three equally spaced node in the medium, two at the boundaries and one at the middle,estimate the exposed surface temperature of the plate 2.5 min. after the start of cooling using the explicit method. **10**

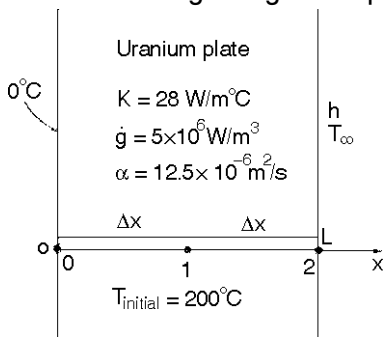

Figure 2

b) Explain Uniform and non-uniform grids. **5**

c) Explain how the finite difference form of ID-heat conduction problem is obtained by using energy balance method. **5**

SECTION – II

5. a) Explain step-by-step procedure for the SIMPLE algorithm of Patankar and Spalding. **7**

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b) Write short note on K-ω Models. **6**

c) Explain Relaxation technique for convergence rate of the iteration sequence in CFD. **8**

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SLR-VB – 119

Seat No.	

Set **S**

B.E. (Mech.) (Part – II) Examination, 2017
COMPUTATIONAL FLUID DYNAMICS
(Professional Elective – 4)

Day and Date : Saturday, 20-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Solve **any two** questions from **each** Section.*
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*3) Figures to the **right** indicate **full** marks.*
*4) Use of non-programmable calculator is **allowed***
*5) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*6) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternative : **(20×1=20)**

1) Physical principle of continuity equation is
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3) In Cartesian coordinate system for infinitely small element fixed in space, the velocity and density are the function of
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   b) Implicit finite difference method
   c) All of the above
   d) None of the above

9) The technique used for solution of elliptical partial differential equation is
   a) Lax Wendroff technique
   b) Relaxation technique
   c) Maccormack's technique
   d) ADI technique

10) CFD technique is used for solving parabolic, hyperbolic and explicit partial differential equation is
   a) Lax Wendroff tech.
   b) Relaxation tech.
   c) Maccormack's tech.
   d) ADI technique

11) In backward difference scheme use the information at the
   a) Right of grid point
   b) Left of grid point
   c) Bottom of grid point
   d) Top of grid point

12) Find a solution by solving an equation involving both the current state of the system and lateral one is called as
   a) Current approach
   b) Explicit approach
   c) Implicit approach
   d) Lateral approach

13) The boundary condition is used for one dimensional conduction problem is
   a) Neumann boundary condition
   b) Type II boundary condition
   c) Dirichlet boundary condition
   d) None of above

14) For Turbulent Flow Reynolds number Re is
   a) Re > 1000 b) Re > 2000 c) Re > 3000 d) Re > 4000

15) Correct CFD analysis sequence is
   a) Modeling – Meshing – Solver – Postprocessor
   b) Modeling – Solver – Meshing – Postprocessor
   c) Meshing – Modeling – Solver – Postprocessor
   d) Modeling – Postprocessor – Meshing – Solver

16) CFD is a
   a) Design Tool
   b) Research Tool
   c) Numerical Tool
   d) All of the above

17) Generally meshing is involved in which of _____ CFD step.
   a) Pre-processor
   b) Post processor
   c) Solver
   d) All of the above

18) The grid generation term are generally used for
   a) Selection of physical model
   b) Definition of fluid property
   c) Specification of boundary condition
   d) Sub division of domain into a no. of smaller sub-domain

19) Which of the following is a method of numerical solution technique ?
   a) Finite difference method
   b) Finite volume method
   c) Finite element method
   d) All of the above

20) Reynolds number is
   a) $\rho\nu L / \mu$ b) $\rho\mu L / \nu$ c) $\rho\mu\nu / L$ d) $\nu\mu L / \rho$

_____

Set S

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Seat No.	

B.E. (Mech.) (Part – II) Examination, 2017
COMPUTATIONAL FLUID DYNAMICS
(Professional Elective – 4)

Day and Date : Saturday, 20-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Solve **any two** questions from **each** Section.*
*2) Assume suitable data if **necessary**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Use of non-programmable calculator is **allowed***

SECTION – I

2. a) Derive continuity equations for a 2-D Cartesian element. **7**
   b) Give applications of CFD. **6**
   c) What is an Implicit Approach ? Explain with the help of example. **7**

3. a) Consider a large plane wall of thickness L = 0.4 m, Thermal Conductivity K=2.3 W/m°C and the left side of the wall is maintained at a constant temperature of 80°C while the right side loses heat by convection to the surrounding air T_∞ =15°C with a heat transfer of h = 24 W/m^2°C. Assuming steady one dimensional heat transfer and taking the nodal spacing to be 0.1 m, A= 20 m^2.
      i) Obtain the finite difference formulation for all nodes
      ii) Determine the nodal temperatures by solving those equations
      iii) Evaluate the rate of heat transfer through the wall. **10**
   b) Consider steady two dimensional heat transfer in a long solid bar of a square cross section is given in the below Figure 1. The measured temperatures at selected points of the outer surfaces are as shown .The thermal conductivity of the body K= 45 W/m °C and there is no heat generation. Using the FDM with a mesh size of $\Delta x = \Delta y$ = 2 cm determine the temperatures at the indicated points in the medium. **10**

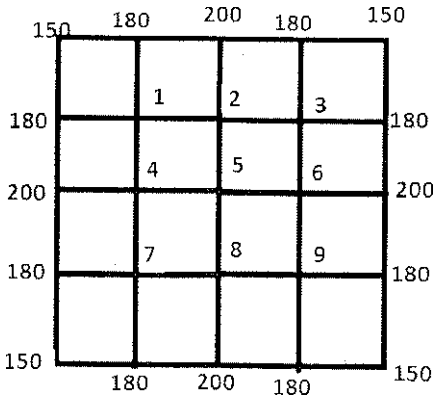

Figure 1

Set S

4. a) Consider a large uranium plate of thickness L = 4 cm, K = 28 W/m°C and $\alpha = 12.5 \times 10^{-5}$ m^2/s that is initially at a uniform temperature of 200°C. Heat is generated uniformly in the plate at a constant rate of $\dot{e} = 5 \times 10^6$ w/m^3. At time t = 0, one side of the plate is brought into contact with iced water and is maintained at 0°C at all times while the other side is subjected to convection to an environment at T_∞ = 30°C with a heat transfer coefficient h = 45 w/m^2°C, as shown in Figure 2 below considering a total of three equally spaced node in the medium, two at the boundaries and one at the middle,estimate the exposed surface temperature of the plate 2.5 min. after the start of cooling using the explicit method. **10**

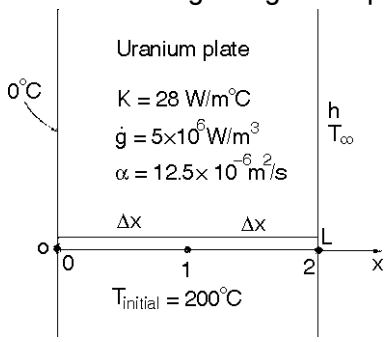

Figure 2

b) Explain Uniform and non-uniform grids. **5**

c) Explain how the finite difference form of ID-heat conduction problem is obtained by using energy balance method. **5**

SECTION – II

5. a) Explain step-by-step procedure for the SIMPLE algorithm of Patankar and Spalding. **7**

b) Explain the FVM for steady one-dimensional convection and diffusion. **6**

c) Write short note on Stream function and Vorticity Method. **7**

6. a) Write short notes on unstructured grid for viscous flow. **7**

b) Explain briefly Lax-Wendroff technique in finite difference method. **6**

c) Explain different plots of computer graphics in CFD. **7**

7. a) Explain the effect of turbulence fluctuations on properties of the mean flow. **6**

b) Write short note on K-ω Models. **6**

c) Explain Relaxation technique for convergence rate of the iteration sequence in CFD. **8**

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SLR-VB – 120

Seat No.	

Set **P**

B.E. (Mech.) Part – II Examination, 2017
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Set up cost does not include
   a) Cost of setting tool and machine
   b) Ordering cost of raw material
   c) Maintenance cost of machine
   d) None of the above

2) Which forecasting technique is not suitable for planning production schedule in the short range ?
   a) Moving average
   b) Exponential moving average
   c) Regression analysis
   d) Delphi

3) In ABC analysis for selective control in inventory management is done by arranging items in decreasing order of
   a) Total inventory costs
   b) Item value
   c) Annual usage value
   d) Item demand

4) In manufacturing management, the term dispatching is used to describe
   a) Dispatches of sales order
   b) Dispatches of factory mail
   c) Dispatches of final product
   d) Dispatches of work orders through shop floor

5) Which of the following factors are not to be considered for production scheduling ?
   a) Sales forecast
   b) Component design
   c) Route sheets
   d) Time

6) In inventory control theory EOQ is
   a) Average level of inventory
   b) Optimum lot size
   c) Lot size corresponding to break-even
   d) Capacity of warehouse

7) The routing function in production system is concerned with
   a) Man power utilization
   b) Machine utilization
   c) Quality assurance of the product
   d) Optimizing material flow through one plant

P.T.O.

8) A production line is said to be balanced when
   a) Each work station has same machines
   b) Each work station has same operators
   c) Waiting time is same at each station
   d) Operation time at each station is same

9) The word Kanban is most appropriately associated with
   a) EOQ
   b) JIT
   c) Capacity planning
   d) Product design

10) In MRP system component demand is
   a) Forecasted
   b) Established by MPS
   c) calculated by MRP system from MPS
   d) Ignored

11) Part families uses data from
   a) Engineering drawing
   b) Production schedule
   c) Bill of materials
   d) Route sheets

12) When using a simple moving average to forecast demand one would
   a) Give equal weight to all demand data
   b) Assign more weight to the recent demand data
   c) Include new demand data in average without discarding earlier data
   d) Include new demand data in the average after discarding some of the earlier demand data

13) Loading may be defined as
   a) Sending the raw material to the machine
   b) Sending the finished material to the store
   c) Assign the work to the facilities
   d) Unloading a software in machine control pannel

14) Bill of material does not consists of
   a) Part number
   b) Specifications of the part
   c) Name of the part
   d) Price of the part

15) Which of the following is not an inventory ?
   a) Machines
   b) Raw material
   c) Finished products
   d) Consumable tools

16) The down time cost consist of
   a) Loss of production
   b) Wages paid to the workers
   c) Reduction in sales
   d) All of the above

17) The cost of insurance and taxes are included in
   a) Cost of ordering
   b) Set-up cost
   c) Inventory carrying cost
   d) Cost of shortages

18) The following is not a classification of maintenance
   a) Corrective b) Timely c) Scheduled d) Preventive

19) Equipment history cards are meant to record
   a) The way equipment behaves
   b) Down time of equipment
   c) The rate at which different components wear off
   d) All the above

20) Belt of an electric motor if broken it needs
   a) Corrective maintenance
   b) Scheduled maintenance
   c) Preventive
   d) Timely

SLR-VB – 120

Seat No.	

B.E. (Mech.) Part – II Examination, 2017
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

N. B. *: Solve* ***any two*** *questions from* ***each*** *Section.*

SECTION – I

2. a) Explain in brief about manufacturing system and their types. **6**

   b) Explain the various inter-relationship between the following functional area. **7**
      i) Production and marketing
      ii) Production and finance

   c) Give the typical organizational structure for production management and list the types of production. **7**

3. a) Define the term forecasting and explain in brief about needs of forecasting. **6**

   b) The demand and forecast for February are 12000 and 10275 respectively. Using single exponential smoothening method find the forecast for the month of March.
      Take smoothening coefficient = 0.25 **4**

   c) Explain in brief the least square method of forecasting. **6**

   d) Compare production planning with production control. **4**

4. a) Define capacity and capacity planning. Explain with example how capacity is measured. **7**

   b) Distinguish between aggregate planning and master scheduling. **6**

   c) What are objectives of PPC and how they are achieved ? **7**

SECTION – II

5. a) What is EOQ ? Derive an expression for the economic order quantity $Q = \sqrt{\frac{2DC_O}{C_h}}$

      Where C_O = Ordering costs
      C_h = Inventory carrying cost
      D = Demand
      also list the assumption made. **7**

   b) A manufacturer has to supply his customers 3600 units of his product per year. Storages are not permitted. Inventory carrying cost amounts Rs. 1.2 per unit per annum. The set-up cost per run is Rs. 80. Find (i) EOQ (ii) Optimum number of orders per annum. **6**

   c) Explain in brief about MRP, CRP and BOM. **7**

Set P

6. a) Explain in brief about preventive and break down maintenance. **6**

   b) Explain in details about maintenance performance evaluation. **7**

   c) Explain various costs associated with inventory. **7**

7. Write short notes on **any four** : **20**

   a) JIT

   b) KAIZEN

   c) Value analysis

   d) Reliability and life testing

   e) ABC analysis.

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Seat No.	

Set **Q**

B.E. (Mech.) Part – II Examination, 2017
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The down time cost consist of
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P.T.O.

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SLR-VB – 120

Seat No.	

B.E. (Mech.) Part – II Examination, 2017
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

N. B. *: Solve* ***any two*** *questions from* ***each*** *Section.*

SECTION – I

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   c) Explain in brief about MRP, CRP and BOM. **7**

Set Q

6. a) Explain in brief about preventive and break down maintenance. **6**

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7. Write short notes on **any four** : **20**

   a) JIT

   b) KAIZEN

   c) Value analysis

   d) Reliability and life testing

   e) ABC analysis.

SLR-VB – 120

Seat No.	

Set **R**

B.E. (Mech.) Part – II Examination, 2017
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* 1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Part families uses data from
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P.T.O.

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SLR-VB – 120

Seat No.	

B.E. (Mech.) Part – II Examination, 2017
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

N. B. *: Solve* ***any two*** *questions from* ***each*** *Section.*

SECTION – I

2. a) Explain in brief about manufacturing system and their types. **6**

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Set R

6. a) Explain in brief about preventive and break down maintenance. **6**

   b) Explain in details about maintenance performance evaluation. **7**

   c) Explain various costs associated with inventory. **7**

7. Write short notes on **any four** : **20**

   a) JIT

   b) KAIZEN

   c) Value analysis

   d) Reliability and life testing

   e) ABC analysis.

SLR-VB – 120

Seat No.	

Set **S**

B.E. (Mech.) Part – II Examination, 2017
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *:* *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

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P.T.O.

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   a) Sending the raw material to the machine
   b) Sending the finished material to the store
   c) Assign the work to the facilities
   d) Unloading a software in machine control pannel

9) Bill of material does not consists of
   a) Part number
   b) Specifications of the part
   c) Name of the part
   d) Price of the part

10) Which of the following is not an inventory ?
   a) Machines
   b) Raw material
   c) Finished products
   d) Consumable tools

11) The down time cost consist of
   a) Loss of production
   b) Wages paid to the workers
   c) Reduction in sales
   d) All of the above

12) The cost of insurance and taxes are included in
   a) Cost of ordering
   b) Set-up cost
   c) Inventory carrying cost
   d) Cost of shortages

13) The following is not a classification of maintenance
   a) Corrective b) Timely c) Scheduled d) Preventive

14) Equipment history cards are meant to record
   a) The way equipment behaves
   b) Down time of equipment
   c) The rate at which different components wear off
   d) All the above

15) Belt of an electric motor if broken it needs
   a) Corrective maintenance
   b) Scheduled maintenance
   c) Preventive
   d) Timely

16) Set up cost does not include
   a) Cost of setting tool and machine
   b) Ordering cost of raw material
   c) Maintenance cost of machine
   d) None of the above

17) Which forecasting technique is not suitable for planning production schedule in the short range ?
   a) Moving average
   b) Exponential moving average
   c) Regression analysis
   d) Delphi

18) In ABC analysis for selective control in inventory management is done by arranging items in decreasing order of
   a) Total inventory costs
   b) Item value
   c) Annual usage value
   d) Item demand

19) In manufacturing management, the term dispatching is used to describe
   a) Dispatches of sales order
   b) Dispatches of factory mail
   c) Dispatches of final product
   d) Dispatches of work orders through shop floor

20) Which of the following factors are not to be considered for production scheduling ?
   a) Sales forecast
   b) Component design
   c) Route sheets
   d) Time

SLR-VB – 120

Seat No.	

B.E. (Mech.) Part – II Examination, 2017
PRODUCTION AND OPERATION MANAGEMENT
(Professional Elective – IV)

Day and Date : Saturday, 20-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

N. B. *: Solve* ***any two*** *questions from* ***each*** *Section.*

SECTION – I

2. a) Explain in brief about manufacturing system and their types. **6**

   b) Explain the various inter-relationship between the following functional area. **7**
      i) Production and marketing
      ii) Production and finance

   c) Give the typical organizational structure for production management and list the types of production. **7**

3. a) Define the term forecasting and explain in brief about needs of forecasting. **6**

   b) The demand and forecast for February are 12000 and 10275 respectively. Using single exponential smoothening method find the forecast for the month of March.
      Take smoothening coefficient = 0.25 **4**

   c) Explain in brief the least square method of forecasting. **6**

   d) Compare production planning with production control. **4**

4. a) Define capacity and capacity planning. Explain with example how capacity is measured. **7**

   b) Distinguish between aggregate planning and master scheduling. **6**

   c) What are objectives of PPC and how they are achieved ? **7**

SECTION – II

5. a) What is EOQ ? Derive an expression for the economic order quantity $Q = \sqrt{\frac{2DC_O}{C_h}}$

      Where C_O = Ordering costs
      C_h = Inventory carrying cost
      D = Demand
      also list the assumption made. **7**

   b) A manufacturer has to supply his customers 3600 units of his product per year. Storages are not permitted. Inventory carrying cost amounts Rs. 1.2 per unit per annum. The set-up cost per run is Rs. 80. Find (i) EOQ (ii) Optimum number of orders per annum. **6**

   c) Explain in brief about MRP, CRP and BOM. **7**

Set S

6. a) Explain in brief about preventive and break down maintenance. **6**

   b) Explain in details about maintenance performance evaluation. **7**

   c) Explain various costs associated with inventory. **7**

7. Write short notes on **any four** : **20**

   a) JIT

   b) KAIZEN

   c) Value analysis

   d) Reliability and life testing

   e) ABC analysis.

SLR-VB – 122

Seat No.	

Set **P**

B.E. (Part – II) (Mechanical) Examination, 2017
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
4) *Make suitable assumptions, if necessary and mention them* ***clearly****.*
5) *Figures to the* ***right*** *indicate* ***full*** *marks.*
6) *Use of non programmable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Single action disc harrow consists of two discs placed
   a) end to end b) front to end c) front to front d) none

2) Offset disc harrows consists of number of gangs
   a) 2 b) 3 c) 4 d) 6

3) Randomly scattering of seeds on the soil surface are known as
   a) broadcasting b) dribbling c) planter d) all of them

4) The power to metering devices is obtained from
   a) drive wheel b) tractor c) animal d) none

5) Wheel hoe type weeders work on _____ action of the operator.
   a) pull b) push c) both d) none

6) Which of the following is the most effective method of weed control ?
   a) manual b) animal operated c) tractor operated d) none

7) Duster is used to apply insecticides in the field which is in form of
   a) dust b) liquid c) granular dust d) coarse granule

8) Sprayers and dusters must be operated
   a) in the direction of wind b) against the wind
   c) in any direction d) during the mid day

P.T.O.

9) During threshing grains are separated from
a) panicles b) cobs c) pods d) all

10) The process of detaching the grains from ear head of the plant is known as
a) threshing b) mowing c) cutting d) none

11) Origin place for olpad thresher is
a) Gujarat b) Maharashtra c) MP d) None

12) Which one of the following is the power source for syndicator type thresher ?
a) prime mover b) man c) animal d) none

13) High volume and high pressure sprayers are classified as
a) Hydraulic b) Hydro pneumatic
c) Blower d) Air blast sprayer

14) Cleaning of sprayer is highly essential
a) before starting the use b) after a day of use
c) in every week d) in every month

15) Which of the following is the primary tillage implement ?
a) mould plough b) subsoiler c) disc plough d) all of these

16) Which of the shares has detachable points ?
a) slip nose share b) slip share c) shin share d) none

17) Disc plough cuts the furrow due to
a) sliding b) rolling c) both d) none of these

18) Harvesting of crop at an appropriate stage of maturity minimizes the
a) field losses b) machine losses c) labor losses d) none

19) Which of the following cylinder is generally used in the combine harvester ?
a) peg tooth b) rasp-bar c) hammer mill d) angle bar

20) Which of the following factor affect the strength of the bond between the grain and the cold ?
a) moisture content of grain b) type and variety of crop
c) ripening phase of grain d) all of these

SLR-VB – 122

Seat No.	

B.E. (Part – II) (Mechanical) Examination, 2017
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *i) Answer **any two** questions from **each** Section.*
*ii) **Neat** diagrams must be drawn **wherever** necessary.*
*iii) Make suitable assumptions, if necessary and mention them **clearly**.*
*iv) Figures to the **right** indicate **full** marks.*
*v) Use of non programmable single memory calculator is **allowed**.*

SECTION – I

2. Solve the following :
   a) Explain the present status of farming in India. **7**
   b) Explain different types of hitches used in hitching implements. **7**
   c) Explain different types of shares used in mould board plough. **6**

3. Solve the following :
   a) Explain different types of harrows with neat sketch. **7**
   b) Explain with neat sketch paddy puddler. **7**
   c) The total draft of a 3-bottom 30 cm MB plough when ploughing 20 cm deep at 5 kmph was 12 KN. Calculates **6**
      1) Specific draft in N/cm^2
      2) What is actual power requirement ?
      3) If the field efficiency is 80%, then what would be the rate of work in hector per hour ?

4. Solve the following :
   a) What is the difference between single action and offset disc harrow ? **7**
   b) Explain forces acting on the mould board plough. **7**
   c) Explain the yokes and harness used for animal draught. **6**

SECTION – II

5. Solve the following :
   a) Explain various fertilizer metering mechanisms with sketch. **7**
   b) Explain with neat sketch spring cultivator. **7**
   c) Explain the working of power duster with neat sketch. **6**

Set P

6. Solve the following :

   a) Explain different types of movers. **7**

   b) The following results are obtained while calibrating a seed drill. Calculate seed rate per hectare. Given data : **7**

      i) No. of furrow openers = 10

      ii) Spacing between furrow = 20 cm

      iii) Diameter of drive wheel = 1.5 m

      iv) rpm = 500

      v) Seed collected = 20 kg.

   c) Write a short note on sweeps and shovels. **6**

7. Solve the following :

   a) Explain field operation adjustment for seed drill. **7**

   b) Explain components with neat sketch of combine harvester. **7**

   c) Explain with neat sketch knapsack sprayer. **6**

SLR-VB – 122

Seat No.	

Set **Q**

B.E. (Part – II) (Mechanical) Examination, 2017
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
4) *Make suitable assumptions, if necessary and mention them* ***clearly****.*
5) *Figures to the* ***right*** *indicate* ***full*** *marks.*
6) *Use of non programmable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Which of the shares has detachable points ?
   a) slip nose share b) slip share c) shin share d) none

2) Disc plough cuts the furrow due to
   a) sliding b) rolling c) both d) none of these

3) Harvesting of crop at an appropriate stage of maturity minimizes the
   a) field losses b) machine losses c) labor losses d) none

4) Which of the following cylinder is generally used in the combine harvester ?
   a) peg tooth b) rasp-bar c) hammer mill d) angle bar

5) Which of the following factor affect the strength of the bond between the grain and the cold ?
   a) moisture content of grain b) type and variety of crop
   c) ripening phase of grain d) all of these

6) Single action disc harrow consists of two discs placed
   a) end to end b) front to end c) front to front d) none

7) Offset disc harrows consists of number of gangs
   a) 2 b) 3 c) 4 d) 6

8) Randomly scattering of seeds on the soil surface are known as
   a) broadcasting b) dribbling c) planter d) all of them

P.T.O.

9) The power to metering devices is obtained from
a) drive wheel b) tractor c) animal d) none

10) Wheel hoe type weeders work on _____ action of the operator.
a) pull b) push c) both d) none

11) Which of the following is the most effective method of weed control ?
a) manual b) animal operated c) tractor operated d) none

12) Duster is used to apply insecticides in the field which is in form of
a) dust b) liquid c) granular dust d) coarse granule

13) Sprayers and dusters must be operated
a) in the direction of wind b) against the wind
c) in any direction d) during the mid day

14) During threshing grains are separated from
a) panicles b) cobs c) pods d) all

15) The process of detaching the grains from ear head of the plant is known as
a) threshing b) mowing c) cutting d) none

16) Origin place for olpad thresher is
a) Gujarat b) Maharashtra c) MP d) None

17) Which one of the following is the power source for syndicator type thresher ?
a) prime mover b) man c) animal d) none

18) High volume and high pressure sprayers are classified as
a) Hydraulic b) Hydro pneumatic
c) Blower d) Air blast sprayer

19) Cleaning of sprayer is highly essential
a) before starting the use b) after a day of use
c) in every week d) in every month

20) Which of the following is the primary tillage implement ?
a) mould plough b) subsoiler c) disc plough d) all of these

SLR-VB – 122

Seat No.	

B.E. (Part – II) (Mechanical) Examination, 2017
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *i) Answer **any two** questions from **each** Section.*
*ii) **Neat** diagrams must be drawn **wherever** necessary.*
*iii) Make suitable assumptions, if necessary and mention them **clearly**.*
*iv) Figures to the **right** indicate **full** marks.*
*v) Use of non programmable single memory calculator is **allowed**.*

SECTION – I

2. Solve the following :
   a) Explain the present status of farming in India. **7**
   b) Explain different types of hitches used in hitching implements. **7**
   c) Explain different types of shares used in mould board plough. **6**

3. Solve the following :
   a) Explain different types of harrows with neat sketch. **7**
   b) Explain with neat sketch paddy puddler. **7**
   c) The total draft of a 3-bottom 30 cm MB plough when ploughing 20 cm deep at 5 kmph was 12 KN. Calculates **6**
      1) Specific draft in N/cm^2
      2) What is actual power requirement ?
      3) If the field efficiency is 80%, then what would be the rate of work in hector per hour ?

4. Solve the following :
   a) What is the difference between single action and offset disc harrow ? **7**
   b) Explain forces acting on the mould board plough. **7**
   c) Explain the yokes and harness used for animal draught. **6**

SECTION – II

5. Solve the following :
   a) Explain various fertilizer metering mechanisms with sketch. **7**
   b) Explain with neat sketch spring cultivator. **7**
   c) Explain the working of power duster with neat sketch. **6**

Set Q

6. Solve the following :

   a) Explain different types of movers. **7**

   b) The following results are obtained while calibrating a seed drill. Calculate seed rate per hectare. Given data : **7**

      i) No. of furrow openers = 10

      ii) Spacing between furrow = 20 cm

      iii) Diameter of drive wheel = 1.5 m

      iv) rpm = 500

      v) Seed collected = 20 kg.

   c) Write a short note on sweeps and shovels. **6**

7. Solve the following :

   a) Explain field operation adjustment for seed drill. **7**

   b) Explain components with neat sketch of combine harvester. **7**

   c) Explain with neat sketch knapsack sprayer. **6**

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Seat No.	

Set **R**

B.E. (Part – II) (Mechanical) Examination, 2017
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
4) *Make suitable assumptions, if necessary and mention them* ***clearly****.*
5) *Figures to the* ***right*** *indicate* ***full*** *marks.*
6) *Use of non programmable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Origin place for olpad thresher is
   a) Gujarat b) Maharashtra c) MP d) None

2) Which one of the following is the power source for syndicator type thresher ?
   a) prime mover b) man c) animal d) none

3) High volume and high pressure sprayers are classified as
   a) Hydraulic b) Hydro pneumatic
   c) Blower d) Air blast sprayer

4) Cleaning of sprayer is highly essential
   a) before starting the use b) after a day of use
   c) in every week d) in every month

5) Which of the following is the primary tillage implement ?
   a) mould plough b) subsoiler c) disc plough d) all of these

6) Which of the shares has detachable points ?
   a) slip nose share b) slip share c) shin share d) none

7) Disc plough cuts the furrow due to
   a) sliding b) rolling c) both d) none of these

8) Harvesting of crop at an appropriate stage of maturity minimizes the
   a) field losses b) machine losses c) labor losses d) none

P.T.O.

9) Which of the following cylinder is generally used in the combine harvester ?
a) peg tooth b) rasp-bar c) hammer mill d) angle bar

10) Which of the following factor affect the strength of the bond between the grain and the cold ?
a) moisture content of grain b) type and variety of crop
c) ripening phase of grain d) all of these

11) Single action disc harrow consists of two discs placed
a) end to end b) front to end c) front to front d) none

12) Offset disc harrows consists of number of gangs
a) 2 b) 3 c) 4 d) 6

13) Randomly scattering of seeds on the soil surface are known as
a) broadcasting b) dribbling c) planter d) all of them

14) The power to metering devices is obtained from
a) drive wheel b) tractor c) animal d) none

15) Wheel hoe type weeders work on _____ action of the operator.
a) pull b) push c) both d) none

16) Which of the following is the most effective method of weed control ?
a) manual b) animal operated c) tractor operated d) none

17) Duster is used to apply insecticides in the field which is in form of
a) dust b) liquid c) granular dust d) coarse granule

18) Sprayers and dusters must be operated
a) in the direction of wind b) against the wind
c) in any direction d) during the mid day

19) During threshing grains are separated from
a) panicles b) cobs c) pods d) all

20) The process of detaching the grains from ear head of the plant is known as
a) threshing b) mowing c) cutting d) none

_____

SLR-VB – 122

Seat No.	

B.E. (Part – II) (Mechanical) Examination, 2017
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *i) Answer **any two** questions from **each** Section.*
*ii) **Neat** diagrams must be drawn **wherever** necessary.*
*iii) Make suitable assumptions, if necessary and mention them **clearly**.*
*iv) Figures to the **right** indicate **full** marks.*
*v) Use of non programmable single memory calculator is **allowed**.*

SECTION – I

2. Solve the following :
   a) Explain the present status of farming in India. **7**
   b) Explain different types of hitches used in hitching implements. **7**
   c) Explain different types of shares used in mould board plough. **6**

3. Solve the following :
   a) Explain different types of harrows with neat sketch. **7**
   b) Explain with neat sketch paddy puddler. **7**
   c) The total draft of a 3-bottom 30 cm MB plough when ploughing 20 cm deep at 5 kmph was 12 KN. Calculates **6**
      1) Specific draft in N/cm^2
      2) What is actual power requirement ?
      3) If the field efficiency is 80%, then what would be the rate of work in hector per hour ?

4. Solve the following :
   a) What is the difference between single action and offset disc harrow ? **7**
   b) Explain forces acting on the mould board plough. **7**
   c) Explain the yokes and harness used for animal draught. **6**

SECTION – II

5. Solve the following :
   a) Explain various fertilizer metering mechanisms with sketch. **7**
   b) Explain with neat sketch spring cultivator. **7**
   c) Explain the working of power duster with neat sketch. **6**

Set R

6. Solve the following :

   a) Explain different types of movers. **7**

   b) The following results are obtained while calibrating a seed drill. Calculate seed rate per hectare. Given data : **7**

      i) No. of furrow openers = 10

      ii) Spacing between furrow = 20 cm

      iii) Diameter of drive wheel = 1.5 m

      iv) rpm = 500

      v) Seed collected = 20 kg.

   c) Write a short note on sweeps and shovels. **6**

7. Solve the following :

   a) Explain field operation adjustment for seed drill. **7**

   b) Explain components with neat sketch of combine harvester. **7**

   c) Explain with neat sketch knapsack sprayer. **6**

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Seat No.	

Set **S**

B.E. (Part – II) (Mechanical) Examination, 2017
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions :
1) *Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***
3) ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
4) *Make suitable assumptions, if necessary and mention them* ***clearly****.*
5) *Figures to the* ***right*** *indicate* ***full*** *marks.*
6) *Use of non programmable single memory calculator is* ***allowed****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Which of the following is the most effective method of weed control ?
   a) manual b) animal operated c) tractor operated d) none

2) Duster is used to apply insecticides in the field which is in form of
   a) dust b) liquid c) granular dust d) coarse granule

3) Sprayers and dusters must be operated
   a) in the direction of wind b) against the wind
   c) in any direction d) during the mid day

4) During threshing grains are separated from
   a) panicles b) cobs c) pods d) all

5) The process of detaching the grains from ear head of the plant is known as
   a) threshing b) mowing c) cutting d) none

6) Origin place for olpad thresher is
   a) Gujarat b) Maharashtra c) MP d) None

7) Which one of the following is the power source for syndicator type thresher ?
   a) prime mover b) man c) animal d) none

8) High volume and high pressure sprayers are classified as
   a) Hydraulic b) Hydro pneumatic
   c) Blower d) Air blast sprayer

P.T.O.

9) Cleaning of sprayer is highly essential
   a) before starting the use b) after a day of use
   c) in every week d) in every month

10) Which of the following is the primary tillage implement ?
   a) mould plough b) subsoiler c) disc plough d) all of these

11) Which of the shares has detachable points ?
   a) slip nose share b) slip share c) shin share d) none

12) Disc plough cuts the furrow due to
   a) sliding b) rolling c) both d) none of these

13) Harvesting of crop at an appropriate stage of maturity minimizes the
   a) field losses b) machine losses c) labor losses d) none

14) Which of the following cylinder is generally used in the combine harvester ?
   a) peg tooth b) rasp-bar c) hammer mill d) angle bar

15) Which of the following factor affect the strength of the bond between the grain and the cold ?
   a) moisture content of grain b) type and variety of crop
   c) ripening phase of grain d) all of these

16) Single action disc harrow consists of two discs placed
   a) end to end b) front to end c) front to front d) none

17) Offset disc harrows consists of number of gangs
   a) 2 b) 3 c) 4 d) 6

18) Randomly scattering of seeds on the soil surface are known as
   a) broadcasting b) dribbling c) planter d) all of them

19) The power to metering devices is obtained from
   a) drive wheel b) tractor c) animal d) none

20) Wheel hoe type weeders work on _____ action of the operator.
   a) pull b) push c) both d) none

_____

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Seat No.	

B.E. (Part – II) (Mechanical) Examination, 2017
AGRO MACHINE ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions : *i) Answer **any two** questions from **each** Section.*
*ii) **Neat** diagrams must be drawn **wherever** necessary.*
*iii) Make suitable assumptions, if necessary and mention them **clearly**.*
*iv) Figures to the **right** indicate **full** marks.*
*v) Use of non programmable single memory calculator is **allowed**.*

SECTION – I

2. Solve the following :
   a) Explain the present status of farming in India. **7**
   b) Explain different types of hitches used in hitching implements. **7**
   c) Explain different types of shares used in mould board plough. **6**

3. Solve the following :
   a) Explain different types of harrows with neat sketch. **7**
   b) Explain with neat sketch paddy puddler. **7**
   c) The total draft of a 3-bottom 30 cm MB plough when ploughing 20 cm deep at 5 kmph was 12 KN. Calculates **6**
      1) Specific draft in N/cm^2
      2) What is actual power requirement ?
      3) If the field efficiency is 80%, then what would be the rate of work in hector per hour ?

4. Solve the following :
   a) What is the difference between single action and offset disc harrow ? **7**
   b) Explain forces acting on the mould board plough. **7**
   c) Explain the yokes and harness used for animal draught. **6**

SECTION – II

5. Solve the following :
   a) Explain various fertilizer metering mechanisms with sketch. **7**
   b) Explain with neat sketch spring cultivator. **7**
   c) Explain the working of power duster with neat sketch. **6**

Set S

6. Solve the following :

   a) Explain different types of movers. **7**

   b) The following results are obtained while calibrating a seed drill. Calculate seed rate per hectare. Given data : **7**

      i) No. of furrow openers = 10

      ii) Spacing between furrow = 20 cm

      iii) Diameter of drive wheel = 1.5 m

      iv) rpm = 500

      v) Seed collected = 20 kg.

   c) Write a short note on sweeps and shovels. **6**

7. Solve the following :

   a) Explain field operation adjustment for seed drill. **7**

   b) Explain components with neat sketch of combine harvester. **7**

   c) Explain with neat sketch knapsack sprayer. **6**

SLR-VB – 123

Seat No.	

Set P

B.E. (Mechanical) (Part – II) Examination, 2017
PLASTIC ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) _____ are the materials added to plastics materials to raise mechanical properties.
a) Fillers b) Plasticizers
c) Reinforcing agents d) None of above

2) Polymers are large chain molecules having a high molecular weight in the range of _____
a) 104 to 107 b) 103 to 107 c) 105 to 108 d) 102 to 108

3) In addition polymerization reaction the polymer is formed in a _____ step.
a) single b) double c) three d) none of above

4) _____ is the most of commonly used manufacturing process among the following, for the plastic components.
a) Injection molding b) Transfer molding
c) Blow molding d) Rotational molding

5) _____ molding is manufacturing process that is used to produce hollow plastic parts.
a) Blow b) Injection c) Compression d) Transfer

6) Generally polymers are very _____ in weight with significant degrees of strength.
a) Heavy b) Light
c) Both a and b d) none of above

7) Successful heated tool welding depends on the _____ of the heated tool surface.
   a) temperature b) pressure
   c) temperature and pressure d) none of above

8) Materials having a _____ shrinkage allowance can be molded with close tolerance.
   a) Low b) High c) Medium d) None of above

9) Due to the nature of plastic the dimension of plastic parts after molding and cooling is _____ than that of the cavity.
   a) Smaller b) Bigger c) Equal d) None of above

10) Transfer molding process combines the principle of _____ and transfer of polymer charge.
   a) Injection b) Compression c) Blow d) Rotation

11) The properties of the polymer will also depend on the _____ available for cooling.
   a) colour b) rate
   c) both colour and rate d) none of above

12) Polymers have very _____ thermal conductivity.
   a) high b) medium c) low d) very high

13) Processing operations, however, demand a _____ 'cooling' operation.
   a) low b) quick c) medium d) moderate

14) It is the _____ operation that sets the shape of thermoplastics.
   a) heating b) cutting c) grinding d) cooling

15) Which of the following is not application of PHBHV ?
   a) Disposable bottles b) Bullet proof jacket
   c) Controlled drug delivery d) Internal sutures

16) What should be the draft for polyethylene material ?
   a) 1/2° b) 1/4° c) 1/8° d) 1/3°

17) A biodegradable polymer should
   a) contained hydrophilic group b) contain hydrophobic
   c) group contain only C-C d) contain aromatic group

18) An example of biodegradable polymer is
   a) PHBV b) PVC c) Polyethylene d) Polyacetylene

19) In compression molding, for phenolic materials suitable pressure range is _____ kg/cm^2.
   a) 100 to 158 b) 158 to 211 c) 211 to 258 d) 250 to 300

20) Bulk factor is the ratio of volume of loose plastic powder to the _____
   a) Actual cavity volume b) Volume of the molding
   c) Volume of loose plastic powder d) None of these

_____

SLR-VB – 123

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
PLASTIC ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) Assume suitable data **whenever** necessary and state it clearly.*
*2) Attempt **any 3** questions from Q**2**, Q**3**, Q**4**, Q**5** and **3** questions from to Q**6**, Q**7**, Q**8**, Q**9**.*

SECTION – I

2. A) Give the Classification of Plastic material. State its various properties along with its relative advantages. **6**

   B) Explain the testing methods for plastics. **7**

3. A) Explain the Injection Moulding method for plastics. **7**

   B) Explain the Hot gas Welding for plastic along with its advantages and applications. **6**

4. A) Explain with a neat sketch a Blow Moulding Process for plastics. **7**

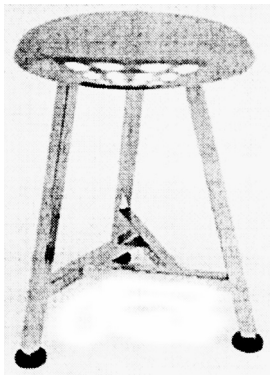
   B) Write a note on High Frequency Induction Welding for plastics. **6**

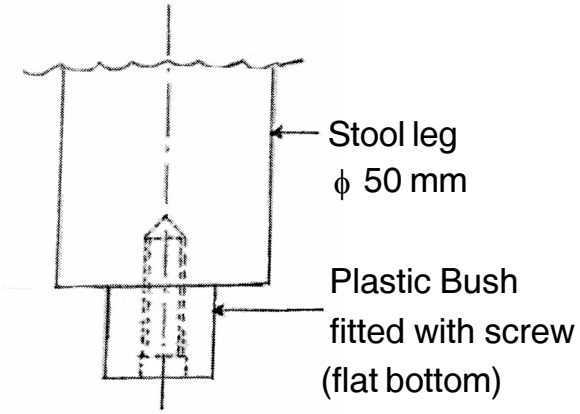
5. A) Discuss on Tolerances of moulded plastic parts. **6**

   B) Plastic Part Design. **8**

   Design the plastic part for the assembly. A stool of a weight 6 kg. having a 3 legs support requires plastic bottom support bushes to restrict scratches, noise etc. Pipe of leg is Dia. 50 mm. and bush is fitted with screw (Dia. 4 mm) to its bottom flat end as shown in fig.

Suggests suitable manufacturing methods for plastic part. Assume suitable mould material, plastic part material and it's necessary relative quantitative data. Draw a sketch of final part design.

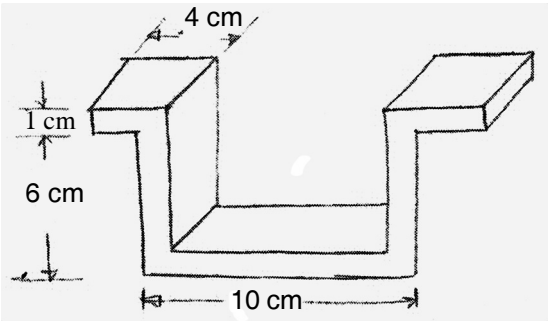




SECTION – II

6. a) With neat sketch explain compression moulding process with advantages limitations and application. **7**

   b) Design a compression mould for a machine component shown in Fig. VI-b which is made up of phenol formaldehyde, thermoset plastic. Take bulk factor = 3, compression pressure = 180 kg./cm^2, density 2g/cm^3. **7**



7. a) Explain in detail hot runner system used in injection mould die. **6**

   b) Explain in detail Ejection system of Injection moulding process. **7**

8. a) Explain any one type of cooling of plastic injection moulding. **4**

   b) Plastic material with temp. 130°C is injected in a mould with flowrate of 60kg/hr. The temperature of mould is maintained at 20° C by cooling circuit. Find out the rate of heat removed by cooling system. (if Cp = 1.67 kJ/kgK, Latent heat = 160 kJ/kg.) **5**

   c) What are types of polymer degradation ? **4**

9. Write short note on

   a) Pot type transfer moulding. **4**

   b) Classification of Injection moulding. **4**

   c) Advanced plastics used in agricultural industries. **5**

Set P

SLR-VB – 123

Seat No.	

Set Q

B.E. (Mechanical) (Part – II) Examination, 2017
PLASTIC ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only.***
Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) What should be the draft for polyethylene material ?
a) 1/2° b) 1/4° c) 1/8° d) 1/3°

2) A biodegradable polymer should
a) contained hydrophilic group b) contain hydrophobic
c) group contain only C-C d) contain aromatic group

3) An example of biodegradable polymer is
a) PHBV b) PVC c) Polyethylene d) Polyacetylene

4) In compression molding, for phenolic materials suitable pressure range is _____ kg/cm^2.
a) 100 to 158 b) 158 to 211 c) 211 to 258 d) 250 to 300

5) Bulk factor is the ratio of volume of loose plastic powder to the _____
a) Actual cavity volume b) Volume of the molding
c) Volume of loose plastic powder d) None of these

6) _____ are the materials added to plastics materials to raise mechanical properties.
a) Fillers b) Plasticizers
c) Reinforcing agents d) None of above

7) Polymers are large chain molecules having a high molecular weight in the range of _____
a) 104 to 107 b) 103 to 107 c) 105 to 108 d) 102 to 108

8) In addition polymerization reaction the polymer is formed in a _____ step.
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P.T.O.

9) _____ is the most of commonly used manufacturing process among the following, for the plastic components.
a) Injection molding b) Transfer molding
c) Blow molding d) Rotational molding

10) _____ molding is manufacturing process that is used to produce hollow plastic parts.
a) Blow b) Injection c) Compression d) Transfer

11) Generally polymers are very _____ in weight with significant degrees of strength.
a) Heavy b) Light
c) Both a and b d) none of above

12) Successful heated tool welding depends on the _____ of the heated tool surface.
a) temperature b) pressure
c) temperature and pressure d) none of above

13) Materials having a _____ shrinkage allowance can be molded with close tolerance.
a) Low b) High c) Medium d) None of above

14) Due to the nature of plastic the dimension of plastic parts after molding and cooling is _____ than that of the cavity.
a) Smaller b) Bigger c) Equal d) None of above

15) Transfer molding process combines the principle of _____ and transfer of polymer charge.
a) Injection b) Compression c) Blow d) Rotation

16) The properties of the polymer will also depend on the _____ available for cooling.
a) colour b) rate
c) both colour and rate d) none of above

17) Polymers have very _____ thermal conductivity.
a) high b) medium c) low d) very high

18) Processing operations, however, demand a _____ 'cooling' operation.
a) low b) quick c) medium d) moderate

19) It is the _____ operation that sets the shape of thermoplastics.
a) heating b) cutting c) grinding d) cooling

20) Which of the following is not application of PHBHV ?
a) Disposable bottles b) Bullet proof jacket
c) Controlled drug delivery d) Internal sutures

_____

SLR-VB – 123

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
PLASTIC ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) Assume suitable data **whenever** necessary and state it clearly.*
*2) Attempt **any 3** questions from Q**2**, Q**3**, Q**4**, Q**5** and **3** questions from to Q**6**, Q**7**, Q**8**, Q**9**.*

SECTION – I

2. A) Give the Classification of Plastic material. State its various properties along with its relative advantages. **6**

   B) Explain the testing methods for plastics. **7**

3. A) Explain the Injection Moulding method for plastics. **7**

   B) Explain the Hot gas Welding for plastic along with its advantages and applications. **6**

4. A) Explain with a neat sketch a Blow Moulding Process for plastics. **7**

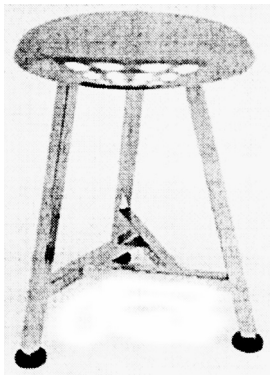
   B) Write a note on High Frequency Induction Welding for plastics. **6**

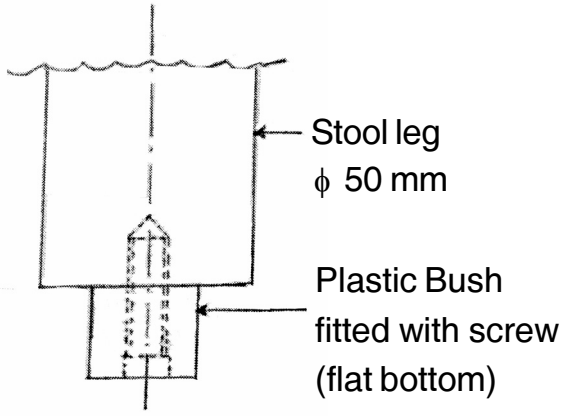
5. A) Discuss on Tolerances of moulded plastic parts. **6**

   B) Plastic Part Design. **8**

   Design the plastic part for the assembly. A stool of a weight 6 kg. having a 3 legs support requires plastic bottom support bushes to restrict scratches, noise etc. Pipe of leg is Dia. 50 mm. and bush is fitted with screw (Dia. 4 mm) to its bottom flat end as shown in fig.

Suggests suitable manufacturing methods for plastic part. Assume suitable mould material, plastic part material and it's necessary relative quantitative data. Draw a sketch of final part design.

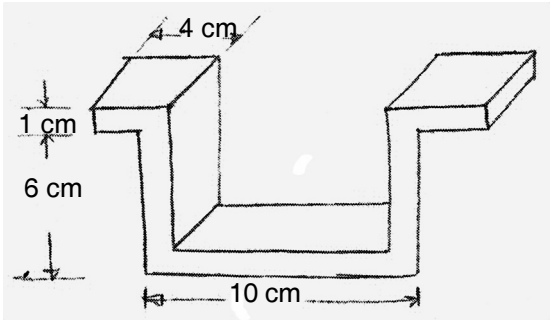




SECTION – II

6. a) With neat sketch explain compression moulding process with advantages limitations and application. **7**

   b) Design a compression mould for a machine component shown in Fig. VI-b which is made up of phenol formaldehyde, thermoset plastic. Take bulk factor = 3, compression pressure = 180 kg./cm^2, density 2g/cm^3. **7**



7. a) Explain in detail hot runner system used in injection mould die. **6**

   b) Explain in detail Ejection system of Injection moulding process. **7**

8. a) Explain any one type of cooling of plastic injection moulding. **4**

   b) Plastic material with temp. 130°C is injected in a mould with flowrate of 60kg/hr. The temperature of mould is maintained at 20° C by cooling circuit. Find out the rate of heat removed by cooling system. (if Cp = 1.67 kJ/kgK, Latent heat = 160 kJ/kg.) **5**

   c) What are types of polymer degradation ? **4**

9. Write short note on

   a) Pot type transfer moulding. **4**

   b) Classification of Injection moulding. **4**

   c) Advanced plastics used in agricultural industries. **5**

Set Q

SLR-VB – 123

Seat No.	

Set **R**

B.E. (Mechanical) (Part – II) Examination, 2017
PLASTIC ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only.***
Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) The properties of the polymer will also depend on the _____ available for cooling.
a) colour b) rate
c) both colour and rate d) none of above

2) Polymers have very _____ thermal conductivity.
a) high b) medium c) low d) very high

3) Processing operations, however, demand a _____ 'cooling' operation.
a) low b) quick c) medium d) moderate

4) It is the _____ operation that sets the shape of thermoplastics.
a) heating b) cutting c) grinding d) cooling

5) Which of the following is not application of PHBHV ?
a) Disposable bottles b) Bullet proof jacket
c) Controlled drug delivery d) Internal sutures

6) What should be the draft for polyethylene material ?
a) 1/2° b) 1/4° c) 1/8° d) 1/3°

7) A biodegradable polymer should
a) contained hydrophilic group b) contain hydrophobic
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8) An example of biodegradable polymer is
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9) In compression molding, for phenolic materials suitable pressure range is _____ kg/cm^2.
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P.T.O.

10) Bulk factor is the ratio of volume of loose plastic powder to the _____
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a) Injection molding b) Transfer molding
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16) Generally polymers are very _____ in weight with significant degrees of strength.
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a) temperature b) pressure
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18) Materials having a _____ shrinkage allowance can be molded with close tolerance.
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19) Due to the nature of plastic the dimension of plastic parts after molding and cooling is _____ than that of the cavity.
a) Smaller b) Bigger c) Equal d) None of above

20) Transfer molding process combines the principle of _____ and transfer of polymer charge.
a) Injection b) Compression c) Blow d) Rotation

_____

SLR-VB – 123

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
PLASTIC ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) Assume suitable data **whenever** necessary and state it clearly.*
*2) Attempt **any 3** questions from Q**2**, Q**3**, Q**4**, Q**5** and **3** questions from to Q**6**, Q**7**, Q**8**, Q**9**.*

SECTION – I

2. A) Give the Classification of Plastic material. State its various properties along with its relative advantages. **6**

   B) Explain the testing methods for plastics. **7**

3. A) Explain the Injection Moulding method for plastics. **7**

   B) Explain the Hot gas Welding for plastic along with its advantages and applications. **6**

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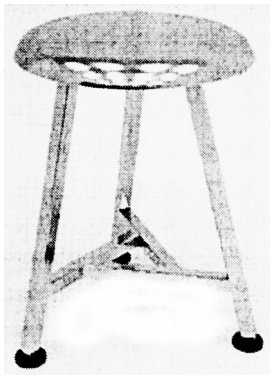
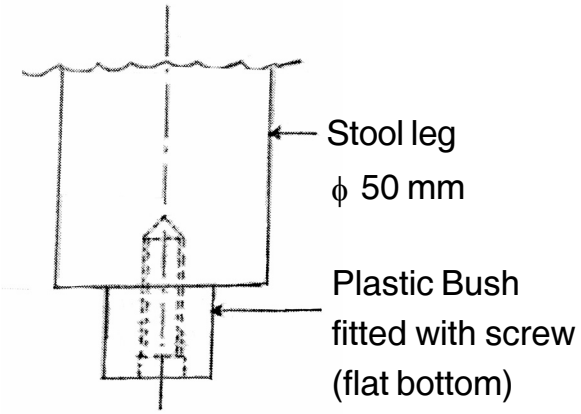
5. A) Discuss on Tolerances of moulded plastic parts. **6**

   B) Plastic Part Design. **8**

   Design the plastic part for the assembly. A stool of a weight 6 kg. having a 3 legs support requires plastic bottom support bushes to restrict scratches, noise etc. Pipe of leg is Dia. 50 mm. and bush is fitted with screw (Dia. 4 mm) to its bottom flat end as shown in fig.

Suggests suitable manufacturing methods for plastic part. Assume suitable mould material, plastic part material and it's necessary relative quantitative data. Draw a sketch of final part design.

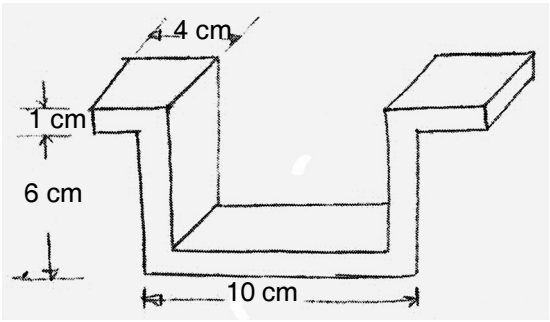




SECTION – II

6. a) With neat sketch explain compression moulding process with advantages limitations and application. **7**

   b) Design a compression mould for a machine component shown in Fig. VI-b which is made up of phenol formaldehyde, thermoset plastic. Take bulk factor = 3, compression pressure = 180 kg./cm^2, density 2g/cm^3. **7**



7. a) Explain in detail hot runner system used in injection mould die. **6**

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   b) Plastic material with temp. 130°C is injected in a mould with flowrate of 60kg/hr. The temperature of mould is maintained at 20° C by cooling circuit. Find out the rate of heat removed by cooling system. (if Cp = 1.67 kJ/kgK, Latent heat = 160 kJ/kg.) **5**

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9. Write short note on

   a) Pot type transfer moulding. **4**

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   c) Advanced plastics used in agricultural industries. **5**

Set R

SLR-VB – 123

Seat No.	

Set S

B.E. (Mechanical) (Part – II) Examination, 2017
PLASTIC ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only.***
Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **(20×1=20)**

1) Generally polymers are very _____ in weight with significant degrees of strength.
   a) Heavy b) Light
   c) Both a and b d) none of above

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   a) temperature b) pressure
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_____

SLR-VB – 123

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
PLASTIC ENGINEERING (Elective – II)

Day and Date : Tuesday, 23-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions**: 1) Assume suitable data **whenever** necessary and state it clearly.*
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SECTION – I

2. A) Give the Classification of Plastic material. State its various properties along with its relative advantages. **6**

   B) Explain the testing methods for plastics. **7**

3. A) Explain the Injection Moulding method for plastics. **7**

   B) Explain the Hot gas Welding for plastic along with its advantages and applications. **6**

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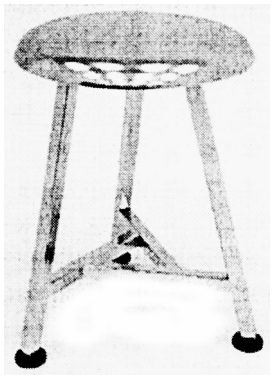
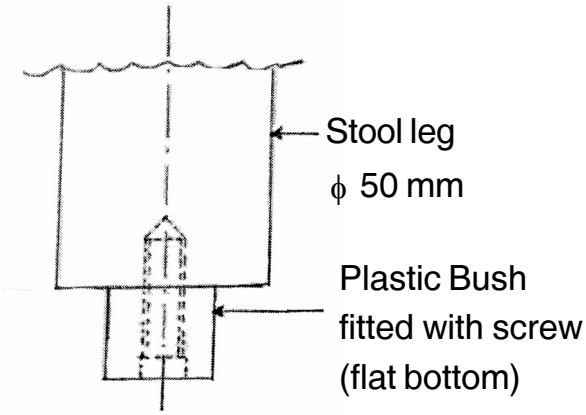
   Design the plastic part for the assembly. A stool of a weight 6 kg. having a 3 legs support requires plastic bottom support bushes to restrict scratches, noise etc. Pipe of leg is Dia. 50 mm. and bush is fitted with screw (Dia. 4 mm) to its bottom flat end as shown in fig.

Suggests suitable manufacturing methods for plastic part. Assume suitable mould material, plastic part material and it's necessary relative quantitative data. Draw a sketch of final part design.

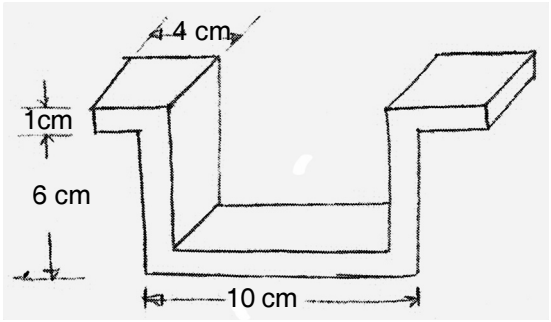




SECTION – II

6. a) With neat sketch explain compression moulding process with advantages limitations and application. **7**

   b) Design a compression mould for a machine component shown in Fig. VI-b which is made up of phenol formaldehyde, thermoset plastic. Take bulk factor = 3, compression pressure = 180 kg./cm^2, density 2g/cm^3. **7**



7. a) Explain in detail hot runner system used in injection mould die. **6**

   b) Explain in detail Ejection system of Injection moulding process. **7**

8. a) Explain any one type of cooling of plastic injection moulding. **4**

   b) Plastic material with temp. 130°C is injected in a mould with flowrate of 60kg/hr. The temperature of mould is maintained at 20° C by cooling circuit. Find out the rate of heat removed by cooling system. (if Cp = 1.67 kJ/kgK, Latent heat = 160 kJ/kg.) **5**

   c) What are types of polymer degradation ? **4**

9. Write short note on

   a) Pot type transfer moulding. **4**

   b) Classification of Injection moulding. **4**

   c) Advanced plastics used in agricultural industries. **5**

Set S

SLR-VB – 124

Seat No.	

Set **P**

B.E. (Mechanical) (Part – II) Examination, 2017
Elective – II : ECONOMICS FOR ENGINEERS

Day and Date : Tuesday, 23-5-2017 Total Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **20**

1) In a free market economy the allocation of resources is determining by
   a) Votes taken by consumers b) A central planning authority
   c) By consumer preference d) The level of profits of firms

2) An improvement in technology would shift
   a) The demand curve inward b) The demand curve outward
   c) The supply curve inward d) The supply curve outward

3) Larger production of _____ goods would lead to higher production in future.
   a) Consumer goods b) Capital goods
   c) Agricultural goods d) Public goods

4) Bread and butter have
   a) Negative cross price elasticity of demand
   b) Positive cross elasticity of demand
   c) Positive income elasticity of demand
   d) Negative income elasticity of demand

5) Trade-offs are required because wants are unlimited and resources are
   a) Economical b) Unlimited c) Efficient d) Scarce

6) Contraction of demand is the result of
   a) Decrease in the number of consumers
   b) Increase in the price of the good concerned
   c) Increase in the price of the other goods
   d) Decrease in the income of purchasers

7) Which of the following pairs of goods is an example of substitutes ?
   a) Tea and sugar b) Tea and coffee
   c) Pen and ink d) Shirt and trousers

8) The law of demand, assuming other things to remain constant, establishes the relationship between
   a) Income of the consumer and the quantity of a good demanded by him
   b) Price of a good and the quantity demanded
   c) Price of a good and the demand for its substitute
   d) Quantity demanded of a good and the relative prices of its complementary goods

9) If the cross-price elasticity between good A and B is positive, we know the goods are
   a) Inferior goods b) Complements
   c) Inelastic d) Substitutes

10) Expansion of demand is due to
   a) Extension in price b) Extension in supply
   c) Fall in the price of the commodity d) Increase in income

11) _____ is a listing of the flows of cash into and out of the business or project.
   a) Balance Sheet b) Cash Flow Statement
   c) Working Capital Statement d) None of these

12) _____ is inevitable in a business organization when undertaking projects.
   a) Profit Maximization b) Risk
   c) Wealth Maximization d) None of these

13) _____ is the tangible fixed asset of the company.
   a) Plant and Machinery b) Goodwill
   c) Patent d) Royalty

14) _____ is the first phase in project life cycle stages.
   a) Planning b) Initiation
   c) Execution d) None of these

15) _____ represents the return of your invested capital over an investment's life span.
   a) Estimation of life of fixed assets b) Cost Effectiveness Analysis
   c) Capital Recovery d) Payback period

16) Cash from _____ activities are included in cash flow statement.
   a) Operating Activities b) Financial Activities
   c) Investment Activities d) All of the above

17) _____ is a form of economic analysis that compares the relative cost and effects of two or more course of action.
   a) Cost Benefit Analysis b) Cost Effectiveness Analysis
   c) Risk Management d) Cash Flow Analysis

18) There are _____ Phases in project life cycle.
   a) Three b) Seven c) Eight d) Four

19) The various production sectors are mutually _____
   a) Interdependent b) Independent
   c) Exclusive d) Inclusive

20) Entrepreneurs frequently form new businesses on the basis of _____
   a) Based on sales b) Team efforts
   c) Unique product idea d) Depends on promotion

_____

SLR-VB – 124

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
Elective – II : ECONOMICS FOR ENGINEERS

Day and Date : Tuesday, 23-5-2017 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
*2) **Draw** the graph **wherever** necessary.*

SECTION – I

2. What is Break-even point ? Explain the determination of Break-even point with its importance. **13**

3. What is price elasticity of demand ? Discuss importance of price elasticity in decision making. **14**

4. a) Explain law of supply with suitable diagram. **5**
   b) Opportunity Cost. **4**
   c) Concept of Engineering Economics. **4**

5. Define production function, explain role of economies of scale in long run production function (Return to scale theory). **13**

SECTION – II

6. Explain the various phases of project life cycle. **13**

7. a) Short note on cost effectiveness analysis. **7**
   b) Short note on resource management. **7**

8. a) Factors determining for project selection. **7**
   b) Determination of economic life of Asset. **6**

9. a) Types of Maintenance. **7**
   b) Make or Buy Decisions. **6**

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Set P

Set P

SLR-VB – 124

Seat No.	

Set **Q**

B.E. (Mechanical) (Part – II) Examination, 2017
Elective – II : ECONOMICS FOR ENGINEERS

Day and Date : Tuesday, 23-5-2017 Total Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **20**

1) Cash from _____ activities are included in cash flow statement.
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P.T.O.

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   a) Estimation of life of fixed assets b) Cost Effectiveness Analysis
   c) Capital Recovery d) Payback period

SLR-VB – 124

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
Elective – II : ECONOMICS FOR ENGINEERS

Day and Date : Tuesday, 23-5-2017 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
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SECTION – I

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SECTION – II

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7. a) Short note on cost effectiveness analysis. **7**
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8. a) Factors determining for project selection. **7**
   b) Determination of economic life of Asset. **6**

9. a) Types of Maintenance. **7**
   b) Make or Buy Decisions. **6**

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Set Q

Set Q

SLR-VB – 124

Seat No.	

Set R

B.E. (Mechanical) (Part – II) Examination, 2017
Elective – II : ECONOMICS FOR ENGINEERS

Day and Date : Tuesday, 23-5-2017 Total Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

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P.T.O.

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   a) Extension in price b) Extension in supply
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_____

SLR-VB – 124

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
Elective – II : ECONOMICS FOR ENGINEERS

Day and Date : Tuesday, 23-5-2017 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
*2) **Draw** the graph **wherever** necessary.*

SECTION – I

2. What is Break-even point ? Explain the determination of Break-even point with its importance. **13**

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SECTION – II

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8. a) Factors determining for project selection. **7**
   b) Determination of economic life of Asset. **6**

9. a) Types of Maintenance. **7**
   b) Make or Buy Decisions. **6**

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Set R

Set R

SLR-VB – 124

Seat No.	

Set S

B.E. (Mechanical) (Part – II) Examination, 2017
Elective – II : ECONOMICS FOR ENGINEERS

Day and Date : Tuesday, 23-5-2017 Total Marks : 100

Time : 3.00 p.m. to 6.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

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MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct alternatives : **20**

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   a) Negative cross price elasticity of demand
   b) Positive cross elasticity of demand
   c) Positive income elasticity of demand
   d) Negative income elasticity of demand

20) Trade-offs are required because wants are unlimited and resources are
   a) Economical b) Unlimited c) Efficient d) Scarce

_____

SLR-VB – 124

Seat No.	

B.E. (Mechanical) (Part – II) Examination, 2017
Elective – II : ECONOMICS FOR ENGINEERS

Day and Date : Tuesday, 23-5-2017 Marks : 80

Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
*2) **Draw** the graph **wherever** necessary.*

SECTION – I

2. What is Break-even point ? Explain the determination of Break-even point with its importance. **13**

3. What is price elasticity of demand ? Discuss importance of price elasticity in decision making. **14**

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5. Define production function, explain role of economies of scale in long run production function (Return to scale theory). **13**

SECTION – II

6. Explain the various phases of project life cycle. **13**

7. a) Short note on cost effectiveness analysis. **7**
   b) Short note on resource management. **7**

8. a) Factors determining for project selection. **7**
   b) Determination of economic life of Asset. **6**

9. a) Types of Maintenance. **7**
   b) Make or Buy Decisions. **6**

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Set S

Set S

SLR-VB – 125

Seat No.	

Set **P**

B.E. (Part – II) (Mechanical) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Thursday, 25-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
2) Make suitable assumptions ***if necessary*** *and mention them* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *mark.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only.***
Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) The standard frequency for electric power supply in India is
   a) 60 Hz b) 50 Hz c) 440 Hz d) 220 Hz
2) In India, largest thermal power station is located at
   a) Kota b) Sarni c) Chandrapur d) Neyveli
3) Demand factor is defined as
   a) Average load/maximum demand b) Maximum demand/connected load
   c) Connected load/maximum demand d) Maximum demand x connected load
4) The average load factor of thermal power plants in India is
   a) 100% b) 80 to 95% c) 50 to 60% d) 20 to 30%
5) The highest point on the load curve represents
   a) Maximum time b) Maximum demand
   c) Maximum concrete load d) KVA rating of generators
6) Diversity factor is always
   a) equal to unity b) less than unity
   c) more than unity d) more than twenty
7) Depreciation charges are high in case of
   a) Thermal plant b) Diesel plant
   c) Hydro-electric plant d) All of the above

P.T.O.

8) Flat plate collector absorbs
   a) Direct radiation b) Diffuse radiation
   c) Direct and diffuse radiation both d) None of the above

9) The sun subtends on the earth an angle of
   a) 30' b) 32' c) 25' d) 35'

10) _____ type of wind mill is of simple design.
   a) Horizontal axis wind mill b) Vertical axis wind mill
   c) Both d) None

11) The cost of wind energy generation compared to conventional power plant for the same power output is
   a) Equal b) Same c) Higher d) Lower

12) The turbine which is used in a tidal power plant for getting continuous power is
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) Any one

13) A geothermal field may yield
   a) Hot water b) Wet steam c) Dry steam d) All of the above

14) Objective of energy audit is
   a) Identify the quality b) Identify the cost of various energy inputs
   c) Either a) or b) d) Both a) and b)

15) The commercial sources of energy are
   a) Solar, wind, biomass
   b) Fossil fuel, hydropower and nuclear energy
   c) Wood, animal waste and agriculture energy
   d) None of above

16) For economical and better operation of a power plant _____ load is always desirable.
   a) Variable b) Oscillating
   c) Constant magnitude d) Alternating

17) From the area under the load curve we can come to know
   a) Approximate load b) Constant increase in power
   c) Steady decrease in power d) Total energy consumption

18) The temperature attained by a flat plate collector is of the
   a) Order of above 90°C b) Range of 100°C to 150°C
   c) Above 150°C d) Below 90°C

19) Maximum wind energy available is proportional to
   a) square of the diameter of rotor b) air density
   c) cube of the wind velocity d) all of above

20) Tides are caused because of
   a) Sun b) Mars c) Moon d) Ocean depth

_____

SLR-VB – 125

Seat No.	

B.E. (Part – II) (Mechanical) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Thursday, 25-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Make suitable assumption ***if necessary*** *and state* ***it clearly****.*

SECTION – I

2. a) Discuss the current electric energy scenario in India. Also elaborate the future trends of electric energy. **7**

   b) What is the significance of load curve ? **7**

   c) A power station is to supply for regions of load whose peak loads are 10 MW, 5 MW, 8 MW and 7 MW. The diversity factor of the load at the station is 1.5 and the average annual load factor is 0.6 calculate,

      1) Maximum demand on the station.

      2) Annual energy supplied from the station. **6**

3. a) Write a note on fixed cost and operating cost. **7**

   b) A residential load is given below, **7**

Time (hr)	0 – 5	5 – 6	6 – 9	9 – 18	18 – 21	21 – 24
Load (kW)	2	6	20	0	12	8

   Draw the load curve and find out the load factor and energy consumed during 24 hrs.

   c) Draw a neat diagram of pump storage plant and explain its working as a peak load plant. **6**

4. a) Evaluate different organizations of power sector in India. **7**

   b) Write a note on : **6**

      i) Average load

      ii) Load factor.

   c) What do you mean by tariff ? Elaborate tariff for electrical energy. **7**

SECTION – II

5. a) Write a note on diffuse radiation and total radiation. **7**

   b) Enumerate types of concentrators and explain cylindrical parabolic concentrator. **7**

   c) What is the role of energy audit in energy conservation ? **6**

6. a) Enumerate types of vertical axis wind machine and state its advantages and disadvantages. **7**

   b) Write a note on flat plate collector. **7**

   c) Give list and explain in short different energy audit instruments. **6**

7. a) Write a note on dolphin type wave machine. **6**

   b) Give classification of wind mill and state its advantages and disadvantages. **7**

   c) Explain in detail any five different energy conservation examples. **7**

SLR-VB – 125

Seat No.	

Set **Q**

B.E. (Part – II) (Mechanical) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Thursday, 25-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
2) Make suitable assumptions ***if necessary*** *and mention them* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *mark.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only.***
Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) For economical and better operation of a power plant _____ load is always desirable.
   a) Variable b) Oscillating
   c) Constant magnitude d) Alternating

2) From the area under the load curve we can come to know
   a) Approximate load b) Constant increase in power
   c) Steady decrease in power d) Total energy consumption

3) The temperature attained by a flat plate collector is of the
   a) Order of above 90°C b) Range of 100°C to 150°C
   c) Above 150°C d) Below 90°C

4) Maximum wind energy available is proportional to
   a) square of the diameter of rotor b) air density
   c) cube of the wind velocity d) all of above

5) Tides are caused because of
   a) Sun b) Mars c) Moon d) Ocean depth

6) The standard frequency for electric power supply in India is
   a) 60 Hz b) 50 Hz c) 440 Hz d) 220 Hz

7) In India, largest thermal power station is located at
   a) Kota b) Sarni c) Chandrapur d) Neyveli

P.T.O.

8) Demand factor is defined as
   a) Average load/maximum demand b) Maximum demand/connected load
   c) Connected load/maximum demand d) Maximum demand x connected load

9) The average load factor of thermal power plants in India is
   a) 100% b) 80 to 95% c) 50 to 60% d) 20 to 30%

10) The highest point on the load curve represents
   a) Maximum time b) Maximum demand
   c) Maximum concrete load d) KVA rating of generators

11) Diversity factor is always
   a) equal to unity b) less than unity
   c) more than unity d) more than twenty

12) Depreciation charges are high in case of
   a) Thermal plant b) Diesel plant
   c) Hydro-electric plant d) All of the above

13) Flat plate collector absorbs
   a) Direct radiation b) Diffuse radiation
   c) Direct and diffuse radiation both d) None of the above

14) The sun subtends on the earth an angle of
   a) 30' b) 32' c) 25' d) 35'

15) _____ type of wind mill is of simple design.
   a) Horizontal axis wind mill b) Vertical axis wind mill
   c) Both d) None

16) The cost of wind energy generation compared to conventional power plant for the same power output is
   a) Equal b) Same c) Higher d) Lower

17) The turbine which is used in a tidal power plant for getting continuous power is
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) Any one

18) A geothermal field may yield
   a) Hot water b) Wet steam c) Dry steam d) All of the above

19) Objective of energy audit is
   a) Identify the quality b) Identify the cost of various energy inputs
   c) Either a) or b) d) Both a) and b)

20) The commercial sources of energy are
   a) Solar, wind, biomass
   b) Fossil fuel, hydropower and nuclear energy
   c) Wood, animal waste and agriculture energy
   d) None of above

SLR-VB – 125

Seat No.	

B.E. (Part – II) (Mechanical) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Thursday, 25-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) Make suitable assumption **if necessary** and state **it clearly**.*

SECTION – I

2. a) Discuss the current electric energy scenario in India. Also elaborate the future trends of electric energy. **7**

   b) What is the significance of load curve ? **7**

   c) A power station is to supply for regions of load whose peak loads are 10 MW, 5 MW, 8 MW and 7 MW. The diversity factor of the load at the station is 1.5 and the average annual load factor is 0.6 calculate,

      1) Maximum demand on the station.

      2) Annual energy supplied from the station. **6**

3. a) Write a note on fixed cost and operating cost. **7**

   b) A residential load is given below, **7**

Time (hr)	0 – 5	5 – 6	6 – 9	9 – 18	18 – 21	21 – 24
Load (kW)	2	6	20	0	12	8

   Draw the load curve and find out the load factor and energy consumed during 24 hrs.

   c) Draw a neat diagram of pump storage plant and explain its working as a peak load plant. **6**

4. a) Evaluate different organizations of power sector in India. **7**

   b) Write a note on : **6**

      i) Average load

      ii) Load factor.

   c) What do you mean by tariff ? Elaborate tariff for electrical energy. **7**

SECTION – II

5. a) Write a note on diffuse radiation and total radiation. **7**

   b) Enumerate types of concentrators and explain cylindrical parabolic concentrator. **7**

   c) What is the role of energy audit in energy conservation ? **6**

6. a) Enumerate types of vertical axis wind machine and state its advantages and disadvantages. **7**

   b) Write a note on flat plate collector. **7**

   c) Give list and explain in short different energy audit instruments. **6**

7. a) Write a note on dolphin type wave machine. **6**

   b) Give classification of wind mill and state its advantages and disadvantages. **7**

   c) Explain in detail any five different energy conservation examples. **7**

SLR-VB – 125

Seat No.	

Set **R**

B.E. (Part – II) (Mechanical) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Thursday, 25-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
2) Make suitable assumptions ***if necessary*** *and mention them* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *mark.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only.***
Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) The cost of wind energy generation compared to conventional power plant for the same power output is
   a) Equal b) Same c) Higher d) Lower
2) The turbine which is used in a tidal power plant for getting continuous power is
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) Any one
3) A geothermal field may yield
   a) Hot water b) Wet steam c) Dry steam d) All of the above
4) Objective of energy audit is
   a) Identify the quality b) Identify the cost of various energy inputs
   c) Either a) or b) d) Both a) and b)
5) The commercial sources of energy are
   a) Solar, wind, biomass
   b) Fossil fuel, hydropower and nuclear energy
   c) Wood, animal waste and agriculture energy
   d) None of above
6) For economical and better operation of a power plant _____ load is always desirable.
   a) Variable b) Oscillating
   c) Constant magnitude d) Alternating

P.T.O.

7) From the area under the load curve we can come to know
   a) Approximate load b) Constant increase in power
   c) Steady decrease in power d) Total energy consumption
8) The temperature attained by a flat plate collector is of the
   a) Order of above 90°C b) Range of 100°C to 150°C
   c) Above 150°C d) Below 90°C
9) Maximum wind energy available is proportional to
   a) square of the diameter of rotor b) air density
   c) cube of the wind velocity d) all of above
10) Tides are caused because of
   a) Sun b) Mars c) Moon d) Ocean depth
11) The standard frequency for electric power supply in India is
   a) 60 Hz b) 50 Hz c) 440 Hz d) 220 Hz
12) In India, largest thermal power station is located at
   a) Kota b) Sarni c) Chandrapur d) Neyveli
13) Demand factor is defined as
   a) Average load/maximum demand b) Maximum demand/connected load
   c) Connected load/maximum demand d) Maximum demand x connected load
14) The average load factor of thermal power plants in India is
   a) 100% b) 80 to 95% c) 50 to 60% d) 20 to 30%
15) The highest point on the load curve represents
   a) Maximum time b) Maximum demand
   c) Maximum concrete load d) KVA rating of generators
16) Diversity factor is always
   a) equal to unity b) less than unity
   c) more than unity d) more than twenty
17) Depreciation charges are high in case of
   a) Thermal plant b) Diesel plant
   c) Hydro-electric plant d) All of the above
18) Flat plate collector absorbs
   a) Direct radiation b) Diffuse radiation
   c) Direct and diffuse radiation both d) None of the above
19) The sun subtends on the earth an angle of
   a) 30' b) 32' c) 25' d) 35'
20) _____ type of wind mill is of simple design.
   a) Horizontal axis wind mill b) Vertical axis wind mill
   c) Both d) None

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Seat No.	

B.E. (Part – II) (Mechanical) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Thursday, 25-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Make suitable assumption ***if necessary*** *and state* ***it clearly****.*

SECTION – I

2. a) Discuss the current electric energy scenario in India. Also elaborate the future trends of electric energy. **7**

   b) What is the significance of load curve ? **7**

   c) A power station is to supply for regions of load whose peak loads are 10 MW, 5 MW, 8 MW and 7 MW. The diversity factor of the load at the station is 1.5 and the average annual load factor is 0.6 calculate,

      1) Maximum demand on the station.

      2) Annual energy supplied from the station. **6**

3. a) Write a note on fixed cost and operating cost. **7**

   b) A residential load is given below, **7**

Time (hr)	0 – 5	5 – 6	6 – 9	9 – 18	18 – 21	21 – 24
Load (kW)	2	6	20	0	12	8

   Draw the load curve and find out the load factor and energy consumed during 24 hrs.

   c) Draw a neat diagram of pump storage plant and explain its working as a peak load plant. **6**

4. a) Evaluate different organizations of power sector in India. **7**

   b) Write a note on : **6**

      i) Average load

      ii) Load factor.

   c) What do you mean by tariff ? Elaborate tariff for electrical energy. **7**

SECTION – II

5. a) Write a note on diffuse radiation and total radiation. **7**

   b) Enumerate types of concentrators and explain cylindrical parabolic concentrator. **7**

   c) What is the role of energy audit in energy conservation ? **6**

6. a) Enumerate types of vertical axis wind machine and state its advantages and disadvantages. **7**

   b) Write a note on flat plate collector. **7**

   c) Give list and explain in short different energy audit instruments. **6**

7. a) Write a note on dolphin type wave machine. **6**

   b) Give classification of wind mill and state its advantages and disadvantages. **7**

   c) Explain in detail any five different energy conservation examples. **7**

SLR-VB – 125

Seat No.	

Set **S**

B.E. (Part – II) (Mechanical) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Thursday, 25-5-2017 Total Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1)* ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
2) Make suitable assumptions ***if necessary*** *and mention them* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *mark.*
4) Q. No. ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
5) ***Answer MCQ/Objective type questions on Page No. 3 only.***
Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Diversity factor is always
   a) equal to unity b) less than unity
   c) more than unity d) more than twenty

2) Depreciation charges are high in case of
   a) Thermal plant b) Diesel plant
   c) Hydro-electric plant d) All of the above

3) Flat plate collector absorbs
   a) Direct radiation b) Diffuse radiation
   c) Direct and diffuse radiation both d) None of the above

4) The sun subtends on the earth an angle of
   a) 30' b) 32' c) 25' d) 35'

5) _____ type of wind mill is of simple design.
   a) Horizontal axis wind mill b) Vertical axis wind mill
   c) Both d) None

6) The cost of wind energy generation compared to conventional power plant for the same power output is
   a) Equal b) Same c) Higher d) Lower

7) The turbine which is used in a tidal power plant for getting continuous power is
   a) Simple impulse turbine b) Reversible type
   c) Propeller type d) Any one

P.T.O.

8) A geothermal field may yield
   a) Hot water b) Wet steam c) Dry steam d) All of the above
9) Objective of energy audit is
   a) Identify the quality b) Identify the cost of various energy inputs
   c) Either a) or b) d) Both a) and b)
10) The commercial sources of energy are
   a) Solar, wind, biomass
   b) Fossil fuel, hydropower and nuclear energy
   c) Wood, animal waste and agriculture energy
   d) None of above
11) For economical and better operation of a power plant _____ load is always desirable.
   a) Variable b) Oscillating
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12) From the area under the load curve we can come to know
   a) Approximate load b) Constant increase in power
   c) Steady decrease in power d) Total energy consumption
13) The temperature attained by a flat plate collector is of the
   a) Order of above 90°C b) Range of 100°C to 150°C
   c) Above 150°C d) Below 90°C
14) Maximum wind energy available is proportional to
   a) square of the diameter of rotor b) air density
   c) cube of the wind velocity d) all of above
15) Tides are caused because of
   a) Sun b) Mars c) Moon d) Ocean depth
16) The standard frequency for electric power supply in India is
   a) 60 Hz b) 50 Hz c) 440 Hz d) 220 Hz
17) In India, largest thermal power station is located at
   a) Kota b) Sarni c) Chandrapur d) Neyveli
18) Demand factor is defined as
   a) Average load/maximum demand b) Maximum demand/connected load
   c) Connected load/maximum demand d) Maximum demand x connected load
19) The average load factor of thermal power plants in India is
   a) 100% b) 80 to 95% c) 50 to 60% d) 20 to 30%
20) The highest point on the load curve represents
   a) Maximum time b) Maximum demand
   c) Maximum concrete load d) KVA rating of generators

_____

SLR-VB – 125

Seat No.	

B.E. (Part – II) (Mechanical) Examination, 2017
POWER PLANT AND ENERGY ENGINEERING

Day and Date : Thursday, 25-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Make suitable assumption ***if necessary*** *and state* ***it clearly****.*

SECTION – I

2. a) Discuss the current electric energy scenario in India. Also elaborate the future trends of electric energy. **7**

   b) What is the significance of load curve ? **7**

   c) A power station is to supply for regions of load whose peak loads are 10 MW, 5 MW, 8 MW and 7 MW. The diversity factor of the load at the station is 1.5 and the average annual load factor is 0.6 calculate,

      1) Maximum demand on the station.

      2) Annual energy supplied from the station. **6**

3. a) Write a note on fixed cost and operating cost. **7**

   b) A residential load is given below, **7**

Time (hr)	0 – 5	5 – 6	6 – 9	9 – 18	18 – 21	21 – 24
Load (kW)	2	6	20	0	12	8

   Draw the load curve and find out the load factor and energy consumed during 24 hrs.

   c) Draw a neat diagram of pump storage plant and explain its working as a peak load plant. **6**

4. a) Evaluate different organizations of power sector in India. **7**

   b) Write a note on : **6**

      i) Average load

      ii) Load factor.

   c) What do you mean by tariff ? Elaborate tariff for electrical energy. **7**

SECTION – II

5. a) Write a note on diffuse radiation and total radiation. **7**

   b) Enumerate types of concentrators and explain cylindrical parabolic concentrator. **7**

   c) What is the role of energy audit in energy conservation ? **6**

6. a) Enumerate types of vertical axis wind machine and state its advantages and disadvantages. **7**

   b) Write a note on flat plate collector. **7**

   c) Give list and explain in short different energy audit instruments. **6**

7. a) Write a note on dolphin type wave machine. **6**

   b) Give classification of wind mill and state its advantages and disadvantages. **7**

   c) Explain in detail any five different energy conservation examples. **7**

SLR-VB – 126

Seat No.	

Set **P**

B.E. (Mech.) (Part – II) Examination, 2017
MATERIAL HANDLING SYSTEMS (Old)

Day and Date : Wednesday, 24-5-2017 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) To transport ferrous material vertically _____ conveyor is used.
a) wheel b) chain c) magnetic d) chute

2) Flat belt conveyor are characterized by
a) Bulk + ON-Floor + No Accumulation
b) Unit + Overhead + Accumulation
c) Unit + On-Floor + No Accumulation
d) Bulk + Overhead + No Accumulation

3) A good plant layout ensures
a) Maximum material handling b) Minimum material handling
c) Machine handling d) None of these

4) _____ conveyors vibrates at a lower frequency and larger amplitude in order to convey larger objects.
a) screw b) magnetic c) oscillating d) none of these

5) OSHA stands for
a) Occupational Safety and Human Administration
b) Occupational Safety and Health Administration
c) Occupational Safety and House Administration
d) None of these

6) Procedure chart gives the information about
a) Inventory b) Inspection
c) Communication d) Material requirement

7) Hand truck are characterized by
a) Non-Pallet + Walk + No Stack + Manual
b) Pallet + Walk + No Stack + Manual
c) Non-Pallet + Walk + Stack + Powered
d) Pallet + Walk + No Stack + Powered

P.T.O.

8) Interlock is available in controls of _____ so that worker can safely service the area.
   a) electric safety b) robotics safety
   c) chemical safety d) radiation safety

9) Conveyors and industrial trucks are the _____ equipment.
   a) Transport b) Positioning
   c) Storage d) Identification and control equipment

10) Storage equipment used for _____ material over a period of time.
   a) catching or stocking b) holding or buffering
   c) storing or hanging d) none of these

11) _____ works on counterbalanced principal.
   a) Gravity conveyors b) Forklift trucks
   c) Picking robot d) None of these

12) Symbol "O" represents for
   a) operation b) store c) inspection d) transport

13) _____ common fork lift truck accidents are considered in material handling system.
   a) Five b) Seven c) One d) Ten

14) Flow diagram in used to study
   a) bottleneck b) sequence of operations
   c) machine maintenance d) operator skill

15) A diagram showing the path followed by men and materials while performing a task is known as
   a) string diagram b) flow process chart
   c) travel chart d) flow diagram

16) Equipment evaluation sheet consist of equipment characteristics, utilization and
   a) safety b) vendor characteristics
   c) flexibility d) unit load

17) For single storey building when the flat floor area is available then _____ system is used.
   a) horizontal flow b) vertical c) zig-zag d) inclined

18) From to chart gives the information about
   a) Density of moves between departments
   b) Equipment
   c) Selection procedure
   d) None of these

19) Symbol "$\Rightarrow$" represents for
   a) operation b) store c) inspection d) movement

20) Instead of a hoist, _____ crane uses a mast with forks or a platform to handle unit loads.
   a) Jib crane b) Bridge crane c) Gantry crane d) Stacker crane

_____

SLR-VB – 126

Seat No.	

B.E. (Mech.) (Part – II) Examination, 2017
MATERIAL HANDLING SYSTEMS (Old)

Day and Date : Wednesday, 24-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the **right** indicate **full** marks.*
*2) Draw **neat** diagram **where** necessary.*

SECTION – I

Solve **any two** questions :

2. a) Explain the objectives, benefits and scope of material handling system. **7**
   b) What is meant by material handling system ? Explain its principles. **7**
   c) Explain any two types of cranes with neat figure. **6**

3. a) Explain any two types of industrial trucks with neat figure. **7**
   b) Explain the need of CIMS in material handling. **7**
   c) Classify and explain the positioning equipments. **6**

4. Write a short note on (**any three**) : **20**
   a) AGV. **6**
   b) CIMS. **7**
   c) Conveyors. **7**
   d) Decking and order picking. **6**

SECTION – II

Solve **any two** questions :

5. a) Define the material flow and Explain with figure various types of flow patterns. **7**
   b) Explain in brief the material handling safety and training. **7**
   c) Explain the factors affecting on selection of material handling equipment. **6**

Set P

6. a) Describe different activities at the receiving to improve efficiency of MHS.. **7**

   b) Explain the selection of material handling equipment in Foundry. **7**

   c) Explain different types of material handling systems. **6**

7. Write a short note on (**any three**) : **20**

   a) General procedure for selection of material handling equipment. **7**

   b) From – to chart. **7**

   c) Degree of mechanization. **6**

   d) Material handling equation. **6**

SLR-VB – 126

Seat No.	

Set **Q**

B.E. (Mech.) (Part – II) Examination, 2017
MATERIAL HANDLING SYSTEMS (Old)

Day and Date : Wednesday, 24-5-2017 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*
2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Equipment evaluation sheet consist of equipment characteristics, utilization and
   a) safety b) vendor characteristics
   c) flexibility d) unit load

2) For single storey building when the flat floor area is available then _____ system is used.
   a) horizontal flow b) vertical c) zig-zag d) inclined

3) From to chart gives the information about
   a) Density of moves between departments
   b) Equipment
   c) Selection procedure
   d) None of these

4) Symbol "$\Rightarrow$" represents for
   a) operation b) store c) inspection d) movement

5) Instead of a hoist, _____ crane uses a mast with forks or a platform to handle unit loads.
   a) Jib crane b) Bridge crane c) Gantry crane d) Stacker crane

6) To transport ferrous material vertically _____ conveyor is used.
   a) wheel b) chain c) magnetic d) chute

7) Flat belt conveyor are characterized by
   a) Bulk + ON-Floor + No Accumulation
   b) Unit + Overhead + Accumulation
   c) Unit + On-Floor + No Accumulation
   d) Bulk + Overhead + No Accumulation

8) A good plant layout ensures
   a) Maximum material handling b) Minimum material handling
   c) Machine handling d) None of these

P.T.O.

9) _____ conveyors vibrates at a lower frequency and larger amplitude in order to convey larger objects.
a) screw b) magnetic c) oscillating d) none of these

10) OSHA stands for
a) Occupational Safety and Human Administration
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c) Occupational Safety and House Administration
d) None of these

11) Procedure chart gives the information about
a) Inventory b) Inspection
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12) Hand truck are characterized by
a) Non-Pallet + Walk + No Stack + Manual
b) Pallet + Walk + No Stack + Manual
c) Non-Pallet + Walk + Stack + Powered
d) Pallet + Walk + No Stack + Powered

13) Interlock is available in controls of _____ so that worker can safely service the area.
a) electric safety b) robotics safety
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14) Conveyors and industrial trucks are the _____ equipment.
a) Transport b) Positioning
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15) Storage equipment used for _____ material over a period of time.
a) catching or stocking b) holding or buffering
c) storing or hanging d) none of these

16) _____ works on counterbalanced principal.
a) Gravity conveyors b) Forklift trucks
c) Picking robot d) None of these

17) Symbol “O” represents for
a) operation b) store c) inspection d) transport

18) _____ common fork lift truck accidents are considered in material handling system.
a) Five b) Seven c) One d) Ten

19) Flow diagram in used to study
a) bottleneck b) sequence of operations
c) machine maintenance d) operator skill

20) A diagram showing the path followed by men and materials while performing a task is known as
a) string diagram b) flow process chart
c) travel chart d) flow diagram

_____

SLR-VB – 126

Seat No.	

B.E. (Mech.) (Part – II) Examination, 2017
MATERIAL HANDLING SYSTEMS (Old)

Day and Date : Wednesday, 24-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the **right** indicate **full** marks.*
*2) Draw **neat** diagram **where** necessary.*

SECTION – I

Solve **any two** questions :

2. a) Explain the objectives, benefits and scope of material handling system. **7**
   b) What is meant by material handling system ? Explain its principles. **7**
   c) Explain any two types of cranes with neat figure. **6**

3. a) Explain any two types of industrial trucks with neat figure. **7**
   b) Explain the need of CIMS in material handling. **7**
   c) Classify and explain the positioning equipments. **6**

4. Write a short note on (**any three**) : **20**
   a) AGV. **6**
   b) CIMS. **7**
   c) Conveyors. **7**
   d) Decking and order picking. **6**

SECTION – II

Solve **any two** questions :

5. a) Define the material flow and Explain with figure various types of flow patterns. **7**
   b) Explain in brief the material handling safety and training. **7**
   c) Explain the factors affecting on selection of material handling equipment. **6**

Set Q

6. a) Describe different activities at the receiving to improve efficiency of MHS.. **7**

   b) Explain the selection of material handling equipment in Foundry. **7**

   c) Explain different types of material handling systems. **6**

7. Write a short note on (**any three**) : **20**

   a) General procedure for selection of material handling equipment. **7**

   b) From – to chart. **7**

   c) Degree of mechanization. **6**

   d) Material handling equation. **6**

SLR-VB – 126

Seat No.	

Set **R**

B.E. (Mech.) (Part – II) Examination, 2017
MATERIAL HANDLING SYSTEMS (Old)

Day and Date : Wednesday, 24-5-2017 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) _____ works on counterbalanced principal.
   a) Gravity conveyors b) Forklift trucks
   c) Picking robot d) None of these

2) Symbol "O" represents for
   a) operation b) store c) inspection d) transport

3) _____ common fork lift truck accidents are considered in material handling system.
   a) Five b) Seven c) One d) Ten

4) Flow diagram in used to study
   a) bottleneck b) sequence of operations
   c) machine maintenance d) operator skill

5) A diagram showing the path followed by men and materials while performing a task is known as
   a) string diagram b) flow process chart
   c) travel chart d) flow diagram

6) Equipment evaluation sheet consist of equipment characteristics, utilization and
   a) safety b) vendor characteristics
   c) flexibility d) unit load

7) For single storey building when the flat floor area is available then _____ system is used.
   a) horizontal flow b) vertical c) zig-zag d) inclined

8) From to chart gives the information about
   a) Density of moves between departments
   b) Equipment
   c) Selection procedure
   d) None of these

P.T.O.

9) Symbol "$\Rightarrow$" represents for
a) operation b) store c) inspection d) movement

10) Instead of a hoist, _____ crane uses a mast with forks or a platform to handle unit loads.
a) Jib crane b) Bridge crane c) Gantry crane d) Stacker crane

11) To transport ferrous material vertically _____ conveyor is used.
a) wheel b) chain c) magnetic d) chute

12) Flat belt conveyor are characterized by
a) Bulk + ON-Floor + No Accumulation
b) Unit + Overhead + Accumulation
c) Unit + On-Floor + No Accumulation
d) Bulk + Overhead + No Accumulation

13) A good plant layout ensures
a) Maximum material handling b) Minimum material handling
c) Machine handling d) None of these

14) _____ conveyors vibrates at a lower frequency and larger amplitude in order to convey larger objects.
a) screw b) magnetic c) oscillating d) none of these

15) OSHA stands for
a) Occupational Safety and Human Administration
b) Occupational Safety and Health Administration
c) Occupational Safety and House Administration
d) None of these

16) Procedure chart gives the information about
a) Inventory b) Inspection
c) Communication d) Material requirement

17) Hand truck are characterized by
a) Non-Pallet + Walk + No Stack + Manual
b) Pallet + Walk + No Stack + Manual
c) Non-Pallet + Walk + Stack + Powered
d) Pallet + Walk + No Stack + Powered

18) Interlock is available in controls of _____ so that worker can safely service the area.
a) electric safety b) robotics safety
c) chemical safety d) radiation safety

19) Conveyors and industrial trucks are the _____ equipment.
a) Transport b) Positioning
c) Storage d) Identification and control equipment

20) Storage equipment used for _____ material over a period of time.
a) catching or stocking b) holding or buffering
c) storing or hanging d) none of these

_____

SLR-VB – 126

Seat No.	

B.E. (Mech.) (Part – II) Examination, 2017
MATERIAL HANDLING SYSTEMS (Old)

Day and Date : Wednesday, 24-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the **right** indicate **full** marks.*
*2) Draw **neat** diagram **where** necessary.*

SECTION – I

Solve **any two** questions :

2. a) Explain the objectives, benefits and scope of material handling system. **7**
   b) What is meant by material handling system ? Explain its principles. **7**
   c) Explain any two types of cranes with neat figure. **6**

3. a) Explain any two types of industrial trucks with neat figure. **7**
   b) Explain the need of CIMS in material handling. **7**
   c) Classify and explain the positioning equipments. **6**

4. Write a short note on (**any three**) : **20**
   a) AGV. **6**
   b) CIMS. **7**
   c) Conveyors. **7**
   d) Decking and order picking. **6**

SECTION – II

Solve **any two** questions :

5. a) Define the material flow and Explain with figure various types of flow patterns. **7**
   b) Explain in brief the material handling safety and training. **7**
   c) Explain the factors affecting on selection of material handling equipment. **6**

Set R

6. a) Describe different activities at the receiving to improve efficiency of MHS.. **7**

   b) Explain the selection of material handling equipment in Foundry. **7**

   c) Explain different types of material handling systems. **6**

7. Write a short note on (**any three**) : **20**

   a) General procedure for selection of material handling equipment. **7**

   b) From – to chart. **7**

   c) Degree of mechanization. **6**

   d) Material handling equation. **6**

SLR-VB – 126

Seat No.	

Set **S**

B.E. (Mech.) (Part – II) Examination, 2017
MATERIAL HANDLING SYSTEMS (Old)

Day and Date : Wednesday, 24-5-2017 Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *1) Q. No. **1** is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.*
*2) **Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer : **20**

1) Procedure chart gives the information about
   a) Inventory b) Inspection
   c) Communication d) Material requirement

2) Hand truck are characterized by
   a) Non-Pallet + Walk + No Stack + Manual
   b) Pallet + Walk + No Stack + Manual
   c) Non-Pallet + Walk + Stack + Powered
   d) Pallet + Walk + No Stack + Powered

3) Interlock is available in controls of _____ so that worker can safely service the area.
   a) electric safety b) robotics safety
   c) chemical safety d) radiation safety

4) Conveyors and industrial trucks are the _____ equipment.
   a) Transport b) Positioning
   c) Storage d) Identification and control equipment

5) Storage equipment used for _____ material over a period of time.
   a) catching or stocking b) holding or buffering
   c) storing or hanging d) none of these

6) _____ works on counterbalanced principal.
   a) Gravity conveyors b) Forklift trucks
   c) Picking robot d) None of these

7) Symbol "O" represents for
   a) operation b) store c) inspection d) transport

8) _____ common fork lift truck accidents are considered in material handling system.
   a) Five b) Seven c) One d) Ten

P.T.O.

9) Flow diagram in used to study
   a) bottleneck
   b) sequence of operations
   c) machine maintenance
   d) operator skill

10) A diagram showing the path followed by men and materials while performing a task is known as
   a) string diagram
   b) flow process chart
   c) travel chart
   d) flow diagram

11) Equipment evaluation sheet consist of equipment characteristics, utilization and
   a) safety
   b) vendor characteristics
   c) flexibility
   d) unit load

12) For single storey building when the flat floor area is available then _____ system is used.
   a) horizontal flow b) vertical c) zig-zag d) inclined

13) From to chart gives the information about
   a) Density of moves between departments
   b) Equipment
   c) Selection procedure
   d) None of these

14) Symbol "$\Rightarrow$" represents for
   a) operation b) store c) inspection d) movement

15) Instead of a hoist, _____ crane uses a mast with forks or a platform to handle unit loads.
   a) Jib crane b) Bridge crane c) Gantry crane d) Stacker crane

16) To transport ferrous material vertically _____ conveyor is used.
   a) wheel b) chain c) magnetic d) chute

17) Flat belt conveyor are characterized by
   a) Bulk + ON-Floor + No Accumulation
   b) Unit + Overhead + Accumulation
   c) Unit + On-Floor + No Accumulation
   d) Bulk + Overhead + No Accumulation

18) A good plant layout ensures
   a) Maximum material handling
   b) Minimum material handling
   c) Machine handling
   d) None of these

18) _____ conveyors vibrates at a lower frequency and larger amplitude in order to convey larger objects.
   a) screw b) magnetic c) oscillating d) none of these

20) OSHA stands for
   a) Occupational Safety and Human Administration
   b) Occupational Safety and Health Administration
   c) Occupational Safety and House Administration
   d) None of these

_____

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Seat No.	

B.E. (Mech.) (Part – II) Examination, 2017
MATERIAL HANDLING SYSTEMS (Old)

Day and Date : Wednesday, 24-5-2017 Marks : 80
Time : 10.00 a.m. to 1.00 p.m.

Instructions *: 1) Figures to the **right** indicate **full** marks.*
*2) Draw **neat** diagram **where** necessary.*

SECTION – I

Solve **any two** questions :

2. a) Explain the objectives, benefits and scope of material handling system. **7**
   b) What is meant by material handling system ? Explain its principles. **7**
   c) Explain any two types of cranes with neat figure. **6**

3. a) Explain any two types of industrial trucks with neat figure. **7**
   b) Explain the need of CIMS in material handling. **7**
   c) Classify and explain the positioning equipments. **6**

4. Write a short note on (**any three**) : **20**
   a) AGV. **6**
   b) CIMS. **7**
   c) Conveyors. **7**
   d) Decking and order picking. **6**

SECTION – II

Solve **any two** questions :

5. a) Define the material flow and Explain with figure various types of flow patterns. **7**
   b) Explain in brief the material handling safety and training. **7**
   c) Explain the factors affecting on selection of material handling equipment. **6**

Set S

6. a) Describe different activities at the receiving to improve efficiency of MHS.. **7**

   b) Explain the selection of material handling equipment in Foundry. **7**

   c) Explain different types of material handling systems. **6**

7. Write a short note on (**any three**) : **20**

   a) General procedure for selection of material handling equipment. **7**

   b) From – to chart. **7**

   c) Degree of mechanization. **6**

   d) Material handling equation. **6**

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Seat No.	

Set P

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Tuesday, 9-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

3) Answer ***any two*** *questions from Section –* ***I*** *and* ***any two*** *from Section –* ***II****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) Suction or vacuum cup are used for _____ object.
   a) Curved b) Flat c) Hole d) None of these

2) What is the function of frame grabber ?
   a) Sensing the object b) Digitizing
   c) Storing d) None of these

3) Segmentation is the process of _____
   a) Noise reduction b) Object recognition
   c) Divide the image d) None of these

4) The main function of the robot is
   a) Sensing the environment by external sensor
   b) Decision making
   c) Performing
   d) All

5) When the joint angles and the different configurations of manipulator are derived from the position orientation, the scheme is known as
   a) Forward kinematics b) Inverse kinematics
   c) Transformation d) None of these

6) Work envelope generated by Cartesian coordinate robot is
   a) Sphere b) Cylinder
   c) Rectangular box d) Triangle

P.T.O.

7) Which type of robot used for assembly purpose ?
a) Jointed arm b) PUMA c) SCARA d) None of these

8) Binary sensors having _____ is the contact device.
a) Fingers b) Micro switch c) Wrist d) None of these

9) The envelope or space within which robot can manipulate the wrist is known as
a) Repeatability b) Accuracy c) Work volume d) Stability

10) The outline boundary of an object within an image is equivalent to identify image is known as
a) Smoothing b) Region growing
c) Edge detection d) None of these

11) Which of the following sensor is used in robot gripper ?
a) Optical b) Tactile c) Laser d) Ultrasonic

12) Pick the best configuration of robot in terms of structural rigidity
a) Cylindrical b) Cartesian c) SCARA d) Spherical

13) Which of the following is not programming language ?
a) WAVE b) TAL c) VAL d) AML

14) Work envelope generated by spherical coordinate robot is
a) Sphere b) Cylinder
c) Rectangular box d) Triangle

15) Robot grippers for industrial robot typically employ _____ actuator.
a) Pneumatic b) Hydraulic c) Electric d) Magnetic

16) For short range distance measurements, which type of sensor in more suitable ?
a) Tactile sensor b) Ultrasonic sensor
c) Optical sensor d) Laser sensor

17) In a CCD camera the term CCD stands for
a) Charge Conduction Device b) Camera Charge Device
c) Charge Coupled Device d) Camera Coupled Device

18) The non manufacturing areas of robotics is
a) Mining b) Agriculture c) Assembly d) Nuclear

19) The term UGV stands for _____
a) Unnamed Ground Vehicle b) Unknown Ground Vehicle
c) Universal Ground Vehicle d) Unmanned Ground Vehicle

20) Which of the following is a robot programming language ?
a) SAIL b) MAIL c) RAIL d) TAIL

_____

SLR-VB – 432

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Tuesday, 9-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instruction *: Answer* ***any two*** *questions from Section –* ***I*** *and* ***any two*** *from Section –* ***II****.*

SECTION – I

Solve **any two** :

2. a) Explain following industrial automation :
   i) Fixed automation
   ii) Programmable automation
   iii) Flexible automation. **8**

   b) What are the different configurations of robot ? Which of these would be the most suitable for the following ?
   a) Spray painting
   b) Welding
   c) Inserting peg into hole
   Explain your choice. **6**

   c) How are sensors classified for robot ? **6**

3. a) Name five different types of robots end effectors. Explain any two. **6**

   b) Define the following :
   a) Work envelope
   b) Work cell
   c) Degrees of freedom
   d) Servomechanism. **8**

   c) What are the tactile sensors ? Explain how they are operated ? **6**

4. a) Explain working principle of DC motor with application. **6**

   b) A vector V = 2i + 5j + 3k is rotated by 60° about the Z axis of the reference frame. It is then translated by 3, 4 and 5 Units in x, y and z direction respectively. Find the vector with reference to the reference frame. **8**

   c) Explain with neat block diagram the steps involved in robot vision system. **6**

SECTION – II

Solve **any two** :

5. a) Distinguish between CCD and CID cameras. **6**

   b) What is thresholding ? Why is it necessary ? **8**

   c) Explain the applications of robot in following :
      i) Welding
      ii) Assembly. **6**

6. a) Explain the applications of robot in following :
      i) Material handling
      ii) Spray painting. **8**

   b) How do you recognize an object ? What are the possible feature that may be extracted to identify an object ? **6**

   c) What are the different robot programming languages ? **6**

7. a) Compare online and offline programming. **8**

   b) Discuss the advantages, application of the wheeled robot. **6**

   c) Explain shape analysis technique of image processing. **6**

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Seat No.	

Set **Q**

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Tuesday, 9-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

3) Answer ***any two*** *questions from Section –* ***I*** *and* ***any two*** *from Section –* ***II****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) For short range distance measurements, which type of sensor in more suitable ?
   a) Tactile sensor b) Ultrasonic sensor
   c) Optical sensor d) Laser sensor

2) In a CCD camera the term CCD stands for
   a) Charge Conduction Device b) Camera Charge Device
   c) Charge Coupled Device d) Camera Coupled Device

3) The non manufacturing areas of robotics is
   a) Mining b) Agriculture c) Assembly d) Nuclear

4) The term UGV stands for _____
   a) Unnamed Ground Vehicle b) Unknown Ground Vehicle
   c) Universal Ground Vehicle d) Unmanned Ground Vehicle

5) Which of the following is a robot programming language ?
   a) SAIL b) MAIL c) RAIL d) TAIL

6) Suction or vacuum cup are used for _____ object.
   a) Curved b) Flat c) Hole d) None of these

7) What is the function of frame grabber ?
   a) Sensing the object b) Digitizing
   c) Storing d) None of these

8) Segmentation is the process of _____
   a) Noise reduction b) Object recognition
   c) Divide the image d) None of these

9) The main function of the robot is
   a) Sensing the environment by external sensor
   b) Decision making
   c) Performing
   d) All

10) When the joint angles and the different configurations of manipulator are derived from the position orientation, the scheme is known as
   a) Forward kinematics b) Inverse kinematics
   c) Transformation d) None of these

11) Work envelope generated by Cartesian coordinate robot is
   a) Sphere b) Cylinder
   c) Rectangular box d) Triangle

12) Which type of robot used for assembly purpose ?
   a) Jointed arm b) PUMA c) SCARA d) None of these

13) Binary sensors having _____ is the contact device.
   a) Fingers b) Micro switch c) Wrist d) None of these

14) The envelope or space within which robot can manipulate the wrist is known as
   a) Repeatability b) Accuracy c) Work volume d) Stability

15) The outline boundary of an object within an image is equivalent to identify image is known as
   a) Smoothing b) Region growing
   c) Edge detection d) None of these

16) Which of the following sensor is used in robot gripper ?
   a) Optical b) Tactile c) Laser d) Ultrasonic

17) Pick the best configuration of robot in terms of structural rigidity
   a) Cylindrical b) Cartesian c) SCARA d) Spherical

18) Which of the following is not programming language ?
   a) WAVE b) TAL c) VAL d) AML

19) Work envelope generated by spherical coordinate robot is
   a) Sphere b) Cylinder
   c) Rectangular box d) Triangle

20) Robot grippers for industrial robot typically employ _____ actuator.
   a) Pneumatic b) Hydraulic c) Electric d) Magnetic

SLR-VB – 432

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Tuesday, 9-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instruction *: Answer* ***any two*** *questions from Section –* ***I*** *and* ***any two*** *from Section –* ***II****.*

SECTION – I

Solve **any two** :

2. a) Explain following industrial automation :
   i) Fixed automation
   ii) Programmable automation
   iii) Flexible automation. **8**

   b) What are the different configurations of robot ? Which of these would be the most suitable for the following ?
   a) Spray painting
   b) Welding
   c) Inserting peg into hole
   Explain your choice. **6**

   c) How are sensors classified for robot ? **6**

3. a) Name five different types of robots end effectors. Explain any two. **6**

   b) Define the following :
   a) Work envelope
   b) Work cell
   c) Degrees of freedom
   d) Servomechanism. **8**

   c) What are the tactile sensors ? Explain how they are operated ? **6**

4. a) Explain working principle of DC motor with application. **6**

   b) A vector V = 2i + 5j + 3k is rotated by 60° about the Z axis of the reference frame. It is then translated by 3, 4 and 5 Units in x, y and z direction respectively. Find the vector with reference to the reference frame. **8**

   c) Explain with neat block diagram the steps involved in robot vision system. **6**

Set Q

SECTION – II

Solve **any two** :

5. a) Distinguish between CCD and CID cameras. **6**

   b) What is thresholding ? Why is it necessary ? **8**

   c) Explain the applications of robot in following :
      i) Welding
      ii) Assembly. **6**

6. a) Explain the applications of robot in following :
      i) Material handling
      ii) Spray painting. **8**

   b) How do you recognize an object ? What are the possible feature that may be extracted to identify an object ? **6**

   c) What are the different robot programming languages ? **6**

7. a) Compare online and offline programming. **8**

   b) Discuss the advantages, application of the wheeled robot. **6**

   c) Explain shape analysis technique of image processing. **6**

SLR-VB – 432

Seat No.	

Set **R**

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Tuesday, 9-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

3) Answer ***any two*** *questions from Section –* ***I*** *and* ***any two*** *from Section –* ***II****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) Which of the following sensor is used in robot gripper ?
a) Optical b) Tactile c) Laser d) Ultrasonic

2) Pick the best configuration of robot in terms of structural rigidity
a) Cylindrical b) Cartesian c) SCARA d) Spherical

3) Which of the following is not programming language ?
a) WAVE b) TAL c) VAL d) AML

4) Work envelope generated by spherical coordinate robot is
a) Sphere b) Cylinder
c) Rectangular box d) Triangle

5) Robot grippers for industrial robot typically employ _____ actuator.
a) Pneumatic b) Hydraulic c) Electric d) Magnetic

6) For short range distance measurements, which type of sensor in more suitable ?
a) Tactile sensor b) Ultrasonic sensor
c) Optical sensor d) Laser sensor

7) In a CCD camera the term CCD stands for
a) Charge Conduction Device b) Camera Charge Device
c) Charge Coupled Device d) Camera Coupled Device

8) The non manufacturing areas of robotics is
   a) Mining b) Agriculture c) Assembly d) Nuclear

9) The term UGV stands for _____
   a) Unnamed Ground Vehicle b) Unknown Ground Vehicle
   c) Universal Ground Vehicle d) Unmanned Ground Vehicle

10) Which of the following is a robot programming language ?
   a) SAIL b) MAIL c) RAIL d) TAIL

11) Suction or vacuum cup are used for _____ object.
   a) Curved b) Flat c) Hole d) None of these

12) What is the function of frame grabber ?
   a) Sensing the object b) Digitizing
   c) Storing d) None of these

13) Segmentation is the process of _____
   a) Noise reduction b) Object recognition
   c) Divide the image d) None of these

14) The main function of the robot is
   a) Sensing the environment by external sensor
   b) Decision making
   c) Performing
   d) All

15) When the joint angles and the different configurations of manipulator are derived from the position orientation, the scheme is known as
   a) Forward kinematics b) Inverse kinematics
   c) Transformation d) None of these

16) Work envelope generated by Cartesian coordinate robot is
   a) Sphere b) Cylinder
   c) Rectangular box d) Triangle

17) Which type of robot used for assembly purpose ?
   a) Jointed arm b) PUMA c) SCARA d) None of these

18) Binary sensors having _____ is the contact device.
   a) Fingers b) Micro switch c) Wrist d) None of these

19) The envelope or space within which robot can manipulate the wrist is known as
   a) Repeatability b) Accuracy c) Work volume d) Stability

20) The outline boundary of an object within an image is equivalent to identify image is known as
   a) Smoothing b) Region growing
   c) Edge detection d) None of these

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SLR-VB – 432

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Tuesday, 9-5-2017 Marks : 80
Time : 3.00 p.m. to 6.00 p.m.

Instruction *: Answer* ***any two*** *questions from Section –* ***I*** *and* ***any two*** *from Section –* ***II****.*

SECTION – I

Solve **any two** :

2. a) Explain following industrial automation :
   i) Fixed automation
   ii) Programmable automation
   iii) Flexible automation. **8**

   b) What are the different configurations of robot ? Which of these would be the most suitable for the following ?
   a) Spray painting
   b) Welding
   c) Inserting peg into hole
   Explain your choice. **6**

   c) How are sensors classified for robot ? **6**

3. a) Name five different types of robots end effectors. Explain any two. **6**

   b) Define the following :
   a) Work envelope
   b) Work cell
   c) Degrees of freedom
   d) Servomechanism. **8**

   c) What are the tactile sensors ? Explain how they are operated ? **6**

4. a) Explain working principle of DC motor with application. **6**

   b) A vector V = 2i + 5j + 3k is rotated by 60° about the Z axis of the reference frame. It is then translated by 3, 4 and 5 Units in x, y and z direction respectively. Find the vector with reference to the reference frame. **8**

   c) Explain with neat block diagram the steps involved in robot vision system. **6**

Set R

SECTION – II

Solve **any two** :

5. a) Distinguish between CCD and CID cameras. **6**

   b) What is thresholding ? Why is it necessary ? **8**

   c) Explain the applications of robot in following :
      i) Welding
      ii) Assembly. **6**

6. a) Explain the applications of robot in following :
      i) Material handling
      ii) Spray painting. **8**

   b) How do you recognize an object ? What are the possible feature that may be extracted to identify an object ? **6**

   c) What are the different robot programming languages ? **6**

7. a) Compare online and offline programming. **8**

   b) Discuss the advantages, application of the wheeled robot. **6**

   c) Explain shape analysis technique of image processing. **6**

SLR-VB – 432

Seat No.	

Set **S**

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : INDUSTRIAL ROBOTICS

Day and Date : Tuesday, 9-5-2017 Max. Marks : 100
Time : 3.00 p.m. to 6.00 p.m.

Instructions *: 1) Q. No.* ***1*** *is* ***compulsory****. It should be solved in* ***first 30 minutes*** *in Answer Book Page No.* ***3****.* ***Each*** *question carries* ***one*** *mark.*

2) ***Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.***

3) Answer ***any two*** *questions from Section –* ***I*** *and* ***any two*** *from Section –* ***II****.*

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 20

1. Choose the correct answer :

1) Work envelope generated by Cartesian coordinate robot is
   a) Sphere b) Cylinder
   c) Rectangular box d) Triangle

2) Which type of robot used for assembly purpose ?
   a) Jointed arm b) PUMA c) SCARA d) None of these

3) Binary sensors having _____ is the contact device.
   a) Fingers b) Micro switch c) Wrist d) None of these

4) The envelope or space within which robot can manipulate the wrist is known as
   a) Repeatability b) Accuracy c) Work volume d) Stability

5) The outline boundary of an object within an image is equivalent to identify image is known as
   a) Smoothing b) Region growing
   c) Edge detection d) None of these

6) Which of the following sensor is used in robot gripper ?
   a) Optical b) Tactile c) Laser d) Ultrasonic

7) Pick the best configuration of robot in terms of structural rigidity
   a) Cylindrical b) Cartesian c) SCARA d) Spherical

8) Which of the following is not programming language ?
   a) WAVE b) TAL c) VAL d) AML

9) Work envelope generated by spherical coordinate robot is
   a) Sphere b) Cylinder
   c) Rectangular box d) Triangle

10) Robot grippers for industrial robot typically employ _____ actuator.
   a) Pneumatic b) Hydraulic c) Electric d) Magnetic

11) For short range distance measurements, which type of sensor in more suitable ?
   a) Tactile sensor b) Ultrasonic sensor
   c) Optical sensor d) Laser sensor

12) In a CCD camera the term CCD stands for
   a) Charge Conduction Device b) Camera Charge Device
   c) Charge Coupled Device d) Camera Coupled Device

13) The non manufacturing areas of robotics is
   a) Mining b) Agriculture c) Assembly d) Nuclear

14) The term UGV stands for _____
   a) Unnamed Ground Vehicle b) Unknown Ground Vehicle
   c) Universal Ground Vehicle d) Unmanned Ground Vehicle

15) Which of the following is a robot programming language ?
   a) SAIL b) MAIL c) RAIL d) TAIL

16) Suction or vacuum cup are used for _____ object.
   a) Curved b) Flat c) Hole d) None of these

17) What is the function of frame grabber ?
   a) Sensing the object b) Digitizing
   c) Storing d) None of these

18) Segmentation is the process of _____
   a) Noise reduction b) Object recognition
   c) Divide the image d) None of these

19) The main function of the robot is
   a) Sensing the environment by external sensor
   b) Decision making
   c) Performing
   d) All

20) When the joint angles and the different configurations of manipulator are derived from the position orientation, the scheme is known as
   a) Forward kinematics b) Inverse kinematics
   c) Transformation d) None of these

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SLR-VB – 432

Seat No.	

B.E. (Mechanical) (Part – I) Examination, 2017
Elective – I : INDUSTRIAL ROBOTICS

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Set S

SECTION – II

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   c) Explain shape analysis technique of image processing. **6**